DEPARTMENT OF GEOSCIENCES AND GEOGRAPHY C18

Spillover effects of Sustainable Development Goals – five case studies

Final report of MSc course GEOG-342 Geographies of Inequalities

Eds. Sari Aroalho & Julia Viertola

HELSINGIN YLIOPISTO
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GEOG-342 Geographies of Inequalities,
Spring 2020

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Publisher:
Department of Geosciences and Geography
P.O. Box 64, 00014 University of Helsinki, Finland

Department of Geosciences and Geography C18
ISSN 1798-7938
ISSN-L 1798-7938 (pdf)
https://helda.helsinki.fi/

Course report
GEOG-342 Geographies of Inequalities
Spillover effects of Sustainable Development Goals - five case studies

Course facilitated in cooperation with National Audit Office of Finland

Editors: Sari Aroalho & Julia Viertola

Helsinki 2020

Cover photo: Sari Aroalho

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Preface

In the Spring of 2020, a new master's level course "Geographies of Inequalities" started at the department of Geosciences and Geography, University of Helsinki. The idea was to promote critical understanding of sustainability policies, their interconnections in different geographical levels, and also critical reading of indicators used for measuring the sustainability goals. The course was open also to exchange students in geography and students from other master's programs at the University of Helsinki. In practice, this meant that scientific backgrounds of the students varied substantially. This can be seen as a positive thing, since it also taught the students to deal with different scientific approaches.

Around thirty students participated in the course which incorporated lectures, individual reading assignments and work in small groups. Each group chose its own theme, through which to discuss issues of global governance of sustainable development and the interdependencies between actions at different geographical levels. Depending on the theme, sustainable development was approached via economic, socio-cultural and ecological frameworks. Profound questions for all groups were the ability of UN's Sustainability Development Goals to recognize the connections between different goals, and the availability of data concerning the goals. The course culminated in a final seminar, in which groups presented their central findings. This report is a compilation of the work of all groups.

For the National Audit Office of Finland (VTV), the collaborative course was an opportunity to get inspiration for it's own work. VTV's approach to the sustainable development includes, besides the long-term approach (future generations) and the three dimensions of sustainability (environmental, social and economic), a third aspect – the global perspective. If we wish to achieve Agenda 2030 and the SDGs, we cannot concentrate only on the performance and effectiveness of our government's actions in our country. On top of that, it is useful to consider what are the possible global effects of national actions. These spillover effects can be unintended, and they can be either positive or negative.

We carried out this course during the covid-19 virus outbreak. After only two meetings, we had to switch the course into an online format. We wish to thank all students for their flexibility and commitment to the course, even when the opportunity for face-to-face discussions was lost. Special thanks to our course assistants Sari Aroalho and Julia Viertola for putting this course report together and for coordinating group work. We are also grateful to Thomas Hanell and Karoliina Pilli-Sihvola for their contribution in the input lectures, as well as all the participants from the European Court of Auditors, Finnish National Audit Office, Prime Minister's Office and HELSUS for their valuable comments in the final seminar, carried out as a webinar.

Helsinki 29.4.2020

Pia Bäcklund & Vivi Niemenmaa

Introduction

The United Nations (UN) adopted the Agenda 2030, the action plan for sustainable development and Sustainable Development Goals (SDGs) in 2015. SDGs are a continuum to the Millennium Development Goals (MDGs) from 2000 and Rio Process dating back to 1992. There are 17 SDGs with 169 targets aimed to achieve by 2030. Globally, much has been achieved, but much remains to be done. (United Nations, 2015; United Nations 2019).

The progress of Sustainable Development Goals can be measured in different ways. UN has developed 231 global indicators to measure the progress at the global level (SDG indicators, 2020). In addition, tracking can take place at country level (e.g. Valtioneuvoston kanslia 2019) and for example at EU level (Eurostat 2019). Many of the indicators measure the same targets in slightly different ways. Although the indicators aim at providing an objective picture of the reality, their selection and data collection methods are always influenced by the institutional practices and individuals who collects the data and interpret the results (Hanell, 2019). Caballero (2019) and Hanell (2019) point out that measurements bring politics to data, when you condense and present issues in one number.

Governing by numbers is common, and this also applies to SDGs (SDG: Indicators and a Monitoring…, 2020). The SDGs are broad goals with several targets that are sometimes difficult to grasp. The question is, do the SDG indicators measure the right issues? Globally there are phenomena, which affect a certain country, but the reasons might be derived from other seemingly unrelated events in other locations. These effects are called spillovers, and we are examining, whether they are recognized and whether there is data available on them in order to take spillovers into account.

The SDGs aim to develop world sustainably, and one manifestation are the various global agreements (e.g. SDG 7, policy brief, 2018). Unfortunately, while countries' governments are paying attention to their performance within their borders, a lot of important impacts can be neglected if there is no attention to goods flowing in and out having effects to other regions (SDG, 2020). Energy produced with coal in neighbouring country can be exported but not calculated in importing country's emissions, and the water usage embedded in producing goods outside country's borders are examples of spillovers, which are often not payed attention to. The multinational nature of manufacturing creates challenges in considering, what is a spillover and who is responsible of them (Abramavičius, 2019)?

"In order to pursue 'policy coherence for sustainable development', the externalities and spillover effects of European policies, production and consumption patterns need to be taken into account." (Meynen & Niestroy, 2019). Spillovers take place for instance in the processing of plastic waste: it can be produced in one place, consumed in another and then disposed to a third. We often take only the consumption part of the supply chain into account but managing the waste in third party countries creates impacts on environment and society (Science and Technical Advisory Panel, 2018). Spillovers are difficult to measure and take into account because supply chains are nowadays complex and international. (Schmidt-Traub, Hoff & Bernlöhr, 2019; SDG, 2020).

Many of the early stages of supply chains take place in Global South. In the discourse of SDGs there is a great inequality between regions geographically. Most of the negative spillovers affect countries, which do not have power to change global relations (Radcliffe, 2004). For example, even though clothing industry in global south creates (low-paid) jobs, it also affects the local society by weakening their quality of life and health. As another example, EU's Common Agricultural Policy concentrates in the agricultural production in the EU but ends up having negative effects to agriculture in Africa.

The five mentioned themes are analyzed in this report. They are important topics for consideration in Finland, but also on EU level and globally. Outsourcing is essential part of global world and it is one of the causes of spillover effects (Khadraoui, 2019). Geographic vantage points will look into the differences and dynamics between high-income and low-income countries, the global injustice and where the burden of spillover effects take place. Achieving SDGs is challenging because of complexity and it is important to see behind the numbers which countries are providing to the public.

Sari Aroalho & Julia Viertola

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List of acronyms

AAA	Nespresso Sustainability program
CBI	Centre for the promotion of impacts from developing countries
CAP	Common Agricultural Policy
CCC	Clean Clothes Campaign
CHP	Cogeneration Heat and Power
CMEF	Common Monitoring and Evaluation Framework
ECOWAS	Economic Community of West African States
EFI	Eco-Management and Audit Scheme
EMAS	Ethical Fashion Initiative
EP	European Parliament
EU	European Union
EU-ETS	European Union Emission Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse Gas Emission
IEA	International Energy Agency
ktoe	Kilotonne of oil equivalent
IMF	International Monetary Fund
NECP	Finland's Integrated Energy and Climate Plan
NGO	Non-Governmental Organization
PCD	Policy Coherent Development
SDG	United Nations Sustainable Development Goals
SHC	Second hand clothes
TWh	Terrawatt hours
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UTZ	Certification program of coffee
UN Comtrade	United Nations Commodity Trade Statistics Database
WATCH	Water Global Change
WB	World Bank
WF	Water Footprint
WFN	Water footprint Network
WWF	World Wildlife Fund
YLE	Yleisradio, General Radio in Finland

The Water Footprint of Finland: a critical review about the spillover effects of water consumption and the use of the Water Footprint Network

Valentin Charlier, Matilda Dok, Julia Keronen, Henna Kukkola

Photo: Sari Aroalho

Introduction

Water footprint is a tool to study the total volume of water use including direct and indirect water use, and it can be calculated for example for a geographical area such as a nation or water basin, for a single product, for a consumer or a group of consumers or organisation (Zhang et al. 2013). It was developed in analogy to the ecological footprint concept, and its aim was to have a consumption-based indicator of water use in contrast to the traditional production-based tools (Hoekstra & Chapagain 2007).

Access to clean water and sanitation for all is one of the Sustainable Development Goals (Goal 6), and "water scarcity affects more than 40 percent of the global population and is projected to rise" (SDG website 2020). The climate change makes weather conditions more and more unpredictable and adds to the frequency of droughts in some areas.

Even with vast amounts of natural freshwater resources to consume locally, Finland has an impact in this global problem as well. The consumption of goods such as coffee produced in countries with greater water scarcity makes Finland an important contributor to the global water crisis and increases the need to find more sustainable ways to use water and lower our collective water footprint.

Aim of report

The aim of this report is to study the main issues of the Finnish water use and to consider how the Water Footprint Network (WFN) could be more useful in Finland. This subject is important, because the water use in Finland has significant spillover effects in other areas. Our geographical point of view is useful when comparing the problem and effects between different areas and locations, which all have their geographical characteristics. One of our aims is to approach and review these subjects critically.

In this report, we will approach the theme with several sections. First, we will clarify some of the main concepts such as the concept of water footprint and spillover effect. We will study the current main problems of Finnish water footprint and its global spillover effects by comparing and analysing the Finnish water consumption with some product examples and visualizations. We will try to assess the link between the water footprint and the SDG's based on the Water Footprint Network.

Materials

This work is divided into three main parts concerning the water footprint. Firstly, a review of the literature on the definition of the water footprint concept, the global water consumption, and a comparison with the specific case of Finland's water footprint. Secondly, the use of the example of coffee consumption in Finland to illustrate the global spillover effects of the water footprint and the impact generated on the achievement of the SDG goals. Finally, an analysis of the Water Footprint Network (WFN) showing what it is, what its objectives are, what applications can be made in Finland and showing what the limitations of the network are in the study of water consumption.

The data used for this report is the data on the global water footprint in the period 1996-2005 from the WFN website, scientific sources on water footprint and its consequences. These data are used because they are currently the most comprehensive and freely available data on water consumption around the world.

Discussion

Water Footprint in Finland regarding to the other nations

The water footprint is defined by the measure of human's appropriation of freshwater resources which are assessed by the water volumes consumed (Evaporation, consumption) or/and polluted per unit of time (Hoekstra, 2011). The water footprint can be divided into three main components: The Blue water footprint which refers to consumption of surface and groundwater resources, the Green water footprint which assesses the volume of rainwater consumed (agriculture and crops production) and the Grey water footprint which reflects the degree of freshwater pollution. Indeed, this is defined by the volume of freshwater that is required to assimilate the load of pollutants based on existing ambient water quality standards (Hoekstra, 2011). On a national scale, the study of water footprint is divided in two different parts: the water footprint of national consumption and the water footprint of national production (Hoekstra, 2011).

The water footprint of national production

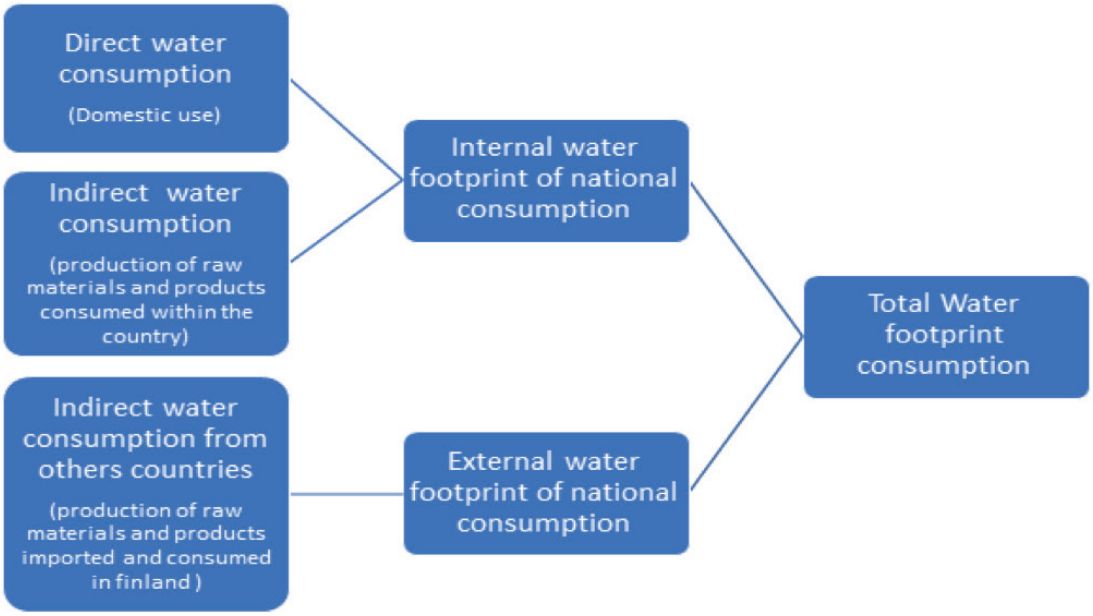

Figure 1: The water footprint consumption based on the studies of WWF-Suomi (2012).

represents the total volume of freshwater consumed or polluted within the territory of the nation as a result of activities within the different sectors of the economy. The three main sectors of water using are the agricultural, the industrial and the domestic water supply sectors (Hoekstra, 2011).

The water footprint of national consumption represents the total volume of freshwater used to produce goods and services consumed by the inhabitants from a nation and it can be described by its two components (Figure 1): the internal water footprint of national consumption which shows the use of domestic water resources to produce goods and services consumed by the nation's population and the external water footprint of national consumption which describes the volume of water resources used in other nations to produce goods and services consumed by the population within the importing nation (Hoekstra, 2011).

Global water footprint

According to the study of Hoekstra and Mekkonen (2011) the global water footprint between 1996 and 2005 was 9087 Gm3 and it was in average 1385 m3 /y per capita. The green water footprint was the biggest components with 74% of freshwater consumed (Figure 2), followed by the blue water footprint (11%) and the grey water footprint (15%).

The green water footprint importance is reflected by the agricultural sector which contributed 92% of the total water footprint. In average, the study showed that the agricultural sector represented by the pasture, the crop production and the animal's breeding are the main parts of the water footprint production and the one which consumed the greater amount of fresh water (green, blue and grey water), it is followed next by the industrial production (4,7%) and the domestic water supply (3,8%) (Table 1).

In total of water footprint of consumption in the world, the main players are China with a total water footprint of 1368 Gm3/y, followed by India and the United States with a total water footprint of 1145 and 821 Gm3/y respectively (Hoekstra, 2012). On average, the water footprint per capita ranges from 1250 to 2850 m3/y per capita in industrialized countries and from 550 to 3800 m3/y per capita in developing countries. These differences can be explained by differences in water consumption and production practices (Hoekstra, 2012). Finally, it is important to note that there is a relatively high dependency on water resources between countries. Indeed, about 22% of the countries global water footprint is due to the global external water footprint of consumption (Hoekstra, 2012).

Finnish water footprint

The Finnish Water Footprint (WF) is not only measured for individuals, businesses, and cities within Finland, but also countries that it trades products and services with (Hoekstra and Mekonnen, 2012). A Finn's daily domestic water consumption

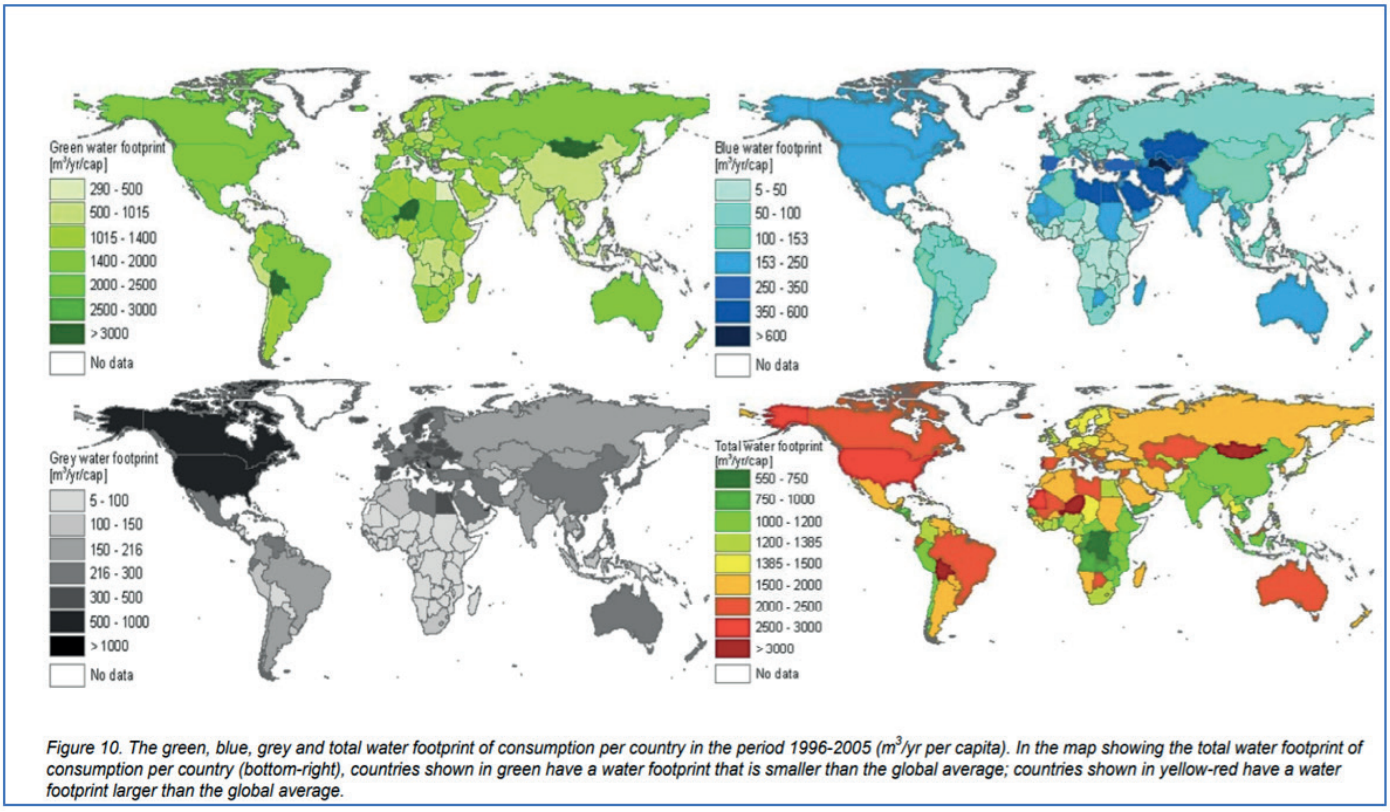

Figure 10. The green, blue, grey and total water footprint of consumption per country in the period 1996-2005 (m^3/yr per capita). In the map showing the total water footprint of consumption per country (bottom-right), countries shown in green have a water footprint that is smaller than the global average; countries shown in yellow-red have a water footprint larger than the global average.

Figure 2: The green, blue, grey, and total water footprint of consumption between the period of 1996-2005 (Hoekstra, 2011).

Table 1. Global water footprint of production (1996-2005).

	Agricultural production			Industrial production	Domestic water supply	Total
	Crop production	Pasture	Water supply in animal raising			
Global water footprint of production (Gm^3/yr)						
- Green	5771*	913**	-	-	-	6684
- Blue	899*	-	46**	38	42	1025
- Grey	733*	-	-	363	282	1378
- Total	7404	913	46	400	324	9087
Water footprint for export (Gm^3/yr)	----------1597----------			165	0	1762
Water footprint for export compared to total (%)	----------19----------			41	0	19

* Source: Mekonnen and Hoekstra (2010b; 2011).

** Source: Mekonnen and Hoekstra (2010c).

Table 1: Global water footprint of production between 1996 and 2005 (Hoekstra, 2011).

(water used for cooking, washing, and cleaning) averages 150 L/day/inhabitant. Considering the consumption of water to produce drinks, food, clothing and other production/consumption goods, the daily water consumption of a Finn amounts to 3874 L/day/capita (WWF-Suomi, 2012).

If we compare Finland's water footprint with those of other nations, we can see that the water consumption footprint is 7.326 billion L/year and the annual footprint of a Finn is about 1414 m3 per capita per year, which is slightly higher than the world average (1358 m3 per capita per year). This high water footprint can be explained by the fact that despite its significant fresh water resources such as surface water (187,888 lakes and ponds as well as 20,500 km of rivers) and deep water abstracted from groundwater, water footprint of Finland is largely due to the consumption of goods (agricultural or manufactured products, etc.) imported from other countries. The external water footprint of national consumption is of great importance in Finland's total water footprint (Hoekstra, 2011; WWF-Suomi, 2012).

Indeed, the internal water footprint of national consumption was 53% and the external water footprint of national consumption was 47%, which means that Finland consumed almost as many goods and services produced within its borders as goods and services provided by other nations. Thus, when analysing the internal and external water consumption figures, some conclusions can be drawn (Hoekstra, 2011; WWF-Suomi, 2012). Firstly, it is the production and consumption of agricultural goods that has the greatest impact on Finland's water footprint. In fact, considering water consumption from internal as well as foreign resources, the agricultural sector accounts for 82% of Finland's total water consumption footprint.

Secondly, water consumption by the agricultural sector can be divided into the following categories: livestock products, agricultural food products, agricultural products, and agricultural products for human consumption. Indeed, 24% of Finland's water footprint is due to meat production and consumption, while 15% is due to dairy products, which is the same figure as the water footprint of the industrial sector. The consumption of tea, coffee and cocoa contributes to 13% of Finland's annual water consumption and finally the production of cereals, sugars, vegetable oils, vegetables, and rubber accounts for the remaining 30% of the agricultural sector (Figure 3). Thirdly, the industrial sector and domestic water consumption account for only 15% and 3% respectively of Finland's water consumption (Figure 3, Table 2).

Finally, the biggest problem that can be observed is Finland's dependence on other nations. Globalisation has opened borders and made it possible to spread people, products, and knowledge, but it has also created a relationship of interdependence between producer and consumer countries. Finland is no exception to this rule, since around 42% of the agricultural products consumed by Finns come from abroad and more than 80% of its manufactured goods are imported. This explains why the external water

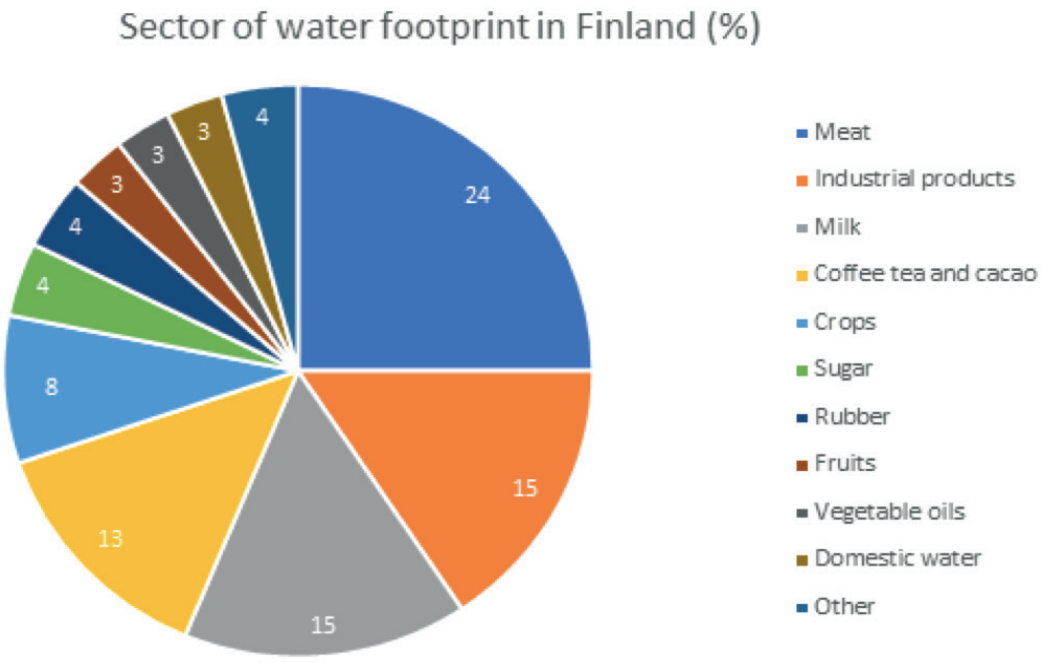

Figure 3 : Total water footprint in Finland according different sectors of water consumption (WWF-Suomi, 2012).

footprint of national consumption accounts for almost half of Finland's total water footprint (Table 2).

Issues and global spillover effects of water footprint in Finland

The water footprint represents the total freshwater volume needed. It is important to realize that water footprints usually have spillover effects in wide areas. According to the World Wildlife Foundation, half of Finnish water footprint exists abroad, affecting countries that suffer from severe water shortage. One good example to study Finnish water footprint is to view the virtual water transfer. The products that Finns use have a little direct physical water transfer from other areas to Finland, but the virtual transfer of water is way more significant. The virtual water content refers to the total volume of water that is needed to produce the product (Hoekstra, 2009).

In line with sustainable development, material flows in industrialised countries must be reduced for production and consumption to be considered sustainable. Europe 2020 Resource efficient Europe3 flagship initiative underlines why Europe should engage in sustainable management of water as a key resource. On June 21st, 2011, the Council of the European Union acknowledged the importance of member states in achieving sustainable and efficient water use through partnership innovations. These innovations to increase water efficiency in industries that use a lot of water like energy production and chemical industry will reduce WF. The global giant coffee retailer Starbucks, for example, focused on sustainable use of water within its stores, which cut water consumption by about 100 gallons (378 litres) of water per day, per store. This was achieved by discontinuing the use of dipper wells, fixtures that constantly stream water to clean utensils and eliminate food residues. This responsibility should not only be at the company level, but also at the individual level.

For citizens to be sensitive to their water footprint, proper market mechanisms should be set up, and there should be a criterion for water saving within a products life cycle. Quality and certification systems like Eco-Management and Audit Scheme (EMAS), and eco-design and water friendly labels for products should be prioritized as proposed by the EU's (2008) Committee of Regions to address water scarcity and droughts in the European Union.

Finnish people use on average 10 kilos roasted coffee per person in a year (Kahvin K. 2019), followed by Scandinavian countries Sweden (10.1 kg) and Norway (8.7 kg). Though Finland is a coffee lover, and consumption is so rampant that it has bloomed into a culture, it represented only 2.0% of total European imports of green coffee beans according to CBI Ministry of Foreign affairs (2017) statistics. The coffee consumed in Finland has multitudinous water consumption somewhere else. This WF of coffee consumption consists mostly of crop water requirements in coffee exporting areas, and the water requirements in processing (Chapagain & Hoekstra, 2007). The water that is needed for

Table 1. Global water footprint of production (1996-2005).

	Agricultural production			Industrial production	Domestic water supply	Total
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Table 2: Water footprint of national consumption (WWF-Suomi, 2012).

coffee drinking in Finland, is not Finnish water.

Almost all Finnish coffee is imported directly from developing countries, like Brazil, and re-exported to Russia and the Baltic states. This has expanded the labour market and led to an increase in employment opportunities for example the operation of companies like Starbucks which has its own Starbucks' Coffee and Farmer Equity Practices that observes quality and sustainable coffee production, Nespresso which has Nespresso AAA Sustainable Quality, Paulig with its UTZ certified coffees and Meira with its fair-trade certified products. These certifications by different organizations and alliances are meant to guarantee the consumer that the products factor in sustainable development practises throughout its life cycles. Sustainable development as a concept is the convergence of the social, economic, and environmental considerations into a holistic practise. UTZ (2020) for example assures consumers that it incorporates gender equality and no child labour as well as environmental protection actions.

In accordance with the UN's (2020) 17 Sustainable Development Goals, guided by SDGs 2, 3, 6, 8, 9, 12, and 13, the company or organisational coffee certifications ensure responsible production practices, inform you of the origin of your coffee products, ensure the wellbeing of people producing these products and wellbeing of the environment. Goal 6 and 12 are particularly important because coffee processing involves dry and wet methods and the wet processing generates huge quantities of high strength wastewater requiring systematic treatment before disposal.

Looking further into the SDGs, we realize that coffee production and consumption is intertwined in almost all of them. Goal 6 is crucial since water scarcity, inadequate sanitation and poor water quality affects food security and quality of life. Freshwater resources are dwindling according to WATCH (2011) and many people face chronic or recurring shortages of fresh water. Yet coffee requires a lot of rain or about 1500-2000 mm per year to grow. Hunger and malnutrition, which are supposed to be eradicated by SDG Goal 2 and 3, are worsened by drought in some of the world's poorest countries according to the UN (2020). These countries are exporters of products that contribute to Finland's virtual WF. Droughts in Brazil and Colombia trigger coffee price increases that translate to profits in the short term. Kaye (2011) counsels that with continuous drought, companies will be compelled to develop programmes that guarantee water conservation throughout their supply chains and especially at the farms.

These droughts are however not limited to the developing world. Mikkonen (2019) reports that, in the year 2018, parts of Finland specifically Petäjävesi experienced drought due to hot summer, quoting mayor Eero Vainio. Children had to use wet-wipes, people used paper plates, avoided using house toilets and were advised to stop hoarding water.

Climate change is another big challenge to the coffee industry. According to the Paulig Group website (2020), the temperature needed for coffee plants varies. Robusta requires 24-30 degrees yet arabica only requires 15-24 degrees. Through the Coffee and Climate project and the International Coffee Partners community, coffee growers are given online and contact training on best farming practices and climate smart agriculture and sensitized about climate change adaptations and mitigation. (Initiative for Coffee and Climate (c&c) website (2018)).

Clearing forests to create space for coffee plantations without reforestation is discouraged. NGOs like Rainforest Alliance and Fair-Trade USA also empower farmers across the globe to handle reforestation projects, in addition to getting modest financial returns. The "shade grown" coffee preserves the watersheds by preventing erosion and provide drinking water.

In our opinion, in order to achieve sustainable, profitable, and strong coffee businesses that survive the global water demand, and a happy consumer base, the water footprint must be analysed from time to time and effective management, preservation and conservation measures observed.

Water Footprint Network (WFN) applied to Finland

As we have observed in this text, the global water consumption and its spillover effects are past the point of sustainable. We are running out of available fresh water and suffering from uneven division of water between nations which affects almost all aspects of our lives. This phenomenon is further enhanced by the climate change. What is more, the current global competition of water resources is not so much caused by the increasing amount of human population in developing countries but by the over-use of resources by the developed nations and the spread of their consumption habits (WWF Suomi 2012).

Production chains using virtual water reach all over the globe. As a network of tools to combat the issue, the Water Footprint Network (WFN) was founded.

The WFN is a non-profit organization with the aim to help partner communities and organizations with five main activities: 1. Network and Exchange, 2. Awareness Raising, 3. Capacity Building, 4. Knowledge and Data Dissemination and 5. Influencing Policy and Practice (Water footprint network 2020a). In their own words, their mission is "to use the water footprint concept to promote the transition toward sustainable, fair and efficient use of freshwater resources worldwide" (Water footprint network 2020a). The WFN's goal is therefore to bring together professionals and organizations to form a network of people and businesses interested in their water use and its impact in the world. Together, they intend to start global conversation and spread information about the importance of water as a resource and how to use it sustainably in different areas of business and ultimately, life.

The studies made about the Finnish water footprint are, for the moment, not created in collaboration with the WFN (Water footprint network 2020b). There are companies, organizations, universities, and governmental branches using the definition of water footprint provided by WFN in their independent publications (see for example Salminen et al. 2017, WWF Suomi 2012). Otherwise, there is a lack of any official collaboration. The water footprint is nevertheless growing its importance and interest in the minds of Finnish authorities as well as private companies. The ways to address the water footprint can be divided in those made by the state, the companies, and individual consumers. These where examined in a report about the Finnish water footprint published by WWF Suomi (2012).

The most important responsibility of the state is to increase the nations knowledge on water footprint and its importance globally. In order to accomplish this, the water footprint should be nationally calculated and ensured that the water use in Finland is sustainable. By including sustainable water use in the national political narrative co-operation between different economic sectors and across the borders a larger impact and reach to the global production chains could be achieved.

Companies should be encouraged to create water strategies for their operational plans and production chains to both be aware and ultimately lower the need of environmentally unsustainable water. By taking care of the sustainability of their actions, they make it easier for consumers to choose water-friendly companies and products to use. Companies can also work with governments to highlight the possible problems existing within the legal framework to lower the risks the companies have regarding water use. Individuals have two goals: to get informed and to make an impact. Everything starts with acquiring information about both the importance of water footprint and their own consumption and its spillover effects globally. This way it is easier to make an impact by consumption choices and to demand companies to address their water footprint and rely on sustainable water sources during their production chain.

Water footprint data criticism and analysis

Even though we have seen widespread use of the definition of water footprint and the Finnish water footprint data published by the WFN, there is some criticism to present as well. First, the national data is published a decade ago, in 2011 with global and national changes in consumption habits, business, producers and technologies between 1996 and 2005 (Hoekstra,2011), there is a need for updating of this data to better depict the current state of water use from the actual amounts of water to localities most impacted by Finnish water consumption. The second difficulty in obtaining recent water footprint data comes from product traceability. Indeed, imported and consumed products represent an important part of the national water footprint of consumption but it is complicated to trace step by step the origins of production of a product and the quantity of water used/polluted during these steps either because it is too laborious or because of a lack of transparency of the partner countries (Hoekstra,2012).

Third, the water footprint indicator can vary considerably depending on the methodology used. Indeed, there are two types of approaches: Bottom up (taking into account the amount of water needed to make consumer goods and services throughout the manufacturing process) and top-down up (taking into account the total amount of water used in a country by adding the water used for imported products and subtracting the water used for exported products), which vary the results despite the fact that they are based on the same original data (Chenoweth, J., 2014). Fourth, separating water

use into three different colours (Blue, Green and Grey) raises issues about the accuracy of the water footprint as a policy tool. Indeed, the Blue and Green water footprints are relative to resource use while the Grey water footprint is an indicator of environmental impact, which confuses the results shown by the water footprint (Chenoweth, J., 2014).

Finally, water consumption varies spatially and temporally, meaning that within a country and within a year there can be very large variations in water consumption. The proper application of the water footprint indicator will depend on a spatiotemporal scale of application. Indeed, on a national scale, the water footprint can provide information to guide major trends (agriculture, industry, trade,...) but on a local or regional scale this indicator is not the most suitable to guide decision making due to a lack of information about the opportunity costs of water resources, the spatial and temporal dimension as well as the socioeconomic and environmental context (Chenoweth, J., 2014).

The water footprint is a well-functioning tool to study and address global and national issues created by water use. The strength of WFN is in providing information and data to its partners. By joining the network, Finnish organizations could demand actions and have a greater impact on both authorities and other organizations to aim for more sustainable use of water both in Finland and other parts of consumption chains of products they use and produce. The government should have the responsibility to ensure that different economic sectors address climate questions and the role water plays in them.

Conclusions

Throughout this report, we have been interested in Finland's water consumption, the global spillover effects and their impact on the achievement of the SDGs through the example of coffee consumption as well as the use of the WFN and its water footprint indicator as a decision-making tool. Although many criticisms can be made about the accuracy of the water footprint, the implementation of the WFN and its indicator has raised awareness of the problems related to water consumption in the world by highlighting for each nation the quantity, source and impact of different sectors of activity on water use. Finland's water footprint, half of which comes from imported products, also highlights the dependence on water between different nations with globalization and the importance of creating tools such as the WFN.

Thus, the governments of Finland and other nations have great responsibility to impact the public and different organizations working inside and outside of their borders. In addition to creating new data and new publications, they are responsible for communicating the importance of water footprint and spreading information about how everyone can have an impact on personal, national, and global water use. Even if the direct impacts of water use cannot be seen where the commodity is bought, sometimes the predictable indirect impacts can and will ultimately affect everyone’s life.

Clan glacier water. Photo: Sari Aroalho

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Coal leakage in electricity generation: Finland and the EU

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Photo: Julia Viertola

Introduction

Finland has had significant energy and climate targets since the United Nations Framework Convention on Climate Change (UNFCCC) was organized in 1992 (Kioton pöytäkirja, 2019), and in recent years, related policies have changed to become more ambitious. The aim has been to reduce the use of fossil fuels and utilize more renewable energy which demands comprehensive thinking in order to solve Finnish energy consumption challenges related to the sustainable development goals (Häyhä et al., 2011). However, the coal use situation in Finland is quite good because of the political will to prohibit the use of coal in electricity and heat production by 2029 (Kivihiilen energiakäytön…, 2019). In addition, according to EU's climate target for Finland, the greenhouse gas emissions (GHG) that are not related to EU's emission trading system (EU-ETS) should decrease 39% compared to the situation in 2005 (Finland's Integrated…, 2019). Still, even though Finland has ambitious goals and it is in the top three in achieving the SDGs, there is a lot of work to be done due to high levels of consumption and the resulting negative spillover effects that have consequences beyond the national borders.

Aim of report

We will focus on coal-produced carbon leakage in electricity production in Finland by comparing it to the regulations of the European Emissions Trading Scheme (EU-ETS) and to actions made by Fortum - which is our case study example of carbon leakage. Our aim is to observe where the carbon leakage occurs and in what context. In addition, it is possible to observe which political decisions cause those negative spillover effects. The main concepts and topics are carbon leakage, electricity production, spillover effects and Finland as part of the EU-ETS.

Researching the changes in energy production in Finland, it is reasonable to check the earlier global situation in the early 2000s. Graus et al. (2007) have studied coal-fired electricity generation and shown that generation has been significantly higher in the United States (ca. 2000 TWh) and China (ca. 1500 TWh) compared to some European countries (on the average below 250 TWh), India, Japan, Korea and Australia. That is why the situation in Finland and Nordic countries has been relatively good. However, compared to other Nordic countries in the 2010s, the share of coal use in energy supply in 2017 has been the highest: Finland 4130 ktoe, Sweden 2046 ktoe, Denmark 1549 ktoe Norway 848 ktoe and Iceland 99 ktoe (Total primary..., 2020). Again, the Finnish government decided in 2019 that the use of coal in electricity and heat production will be prohibited by 2029 (Kivihiilen energiakäytön…, 2019). That is why it is important to study how the need for electricity and heat will be replaced in the future, while coal-related carbon leakage is an existing threat.

It is also important to cast a critical eye over Finland's broader, indirect role in the global issue of carbon leakage. It is known that despite having ambitious climate targets, Finland also has one of the highest levels of consumption emissions globally (Hickel, 2019). Additionally, the recent acquisition of shares in German energy company Uniper, by majority-state-owned Fortum, raises important questions about accountability for carbon emissions, and highlights the necessity of rigorous indicator frameworks. This is explored in an in-depth case study below.

Materials

Research articles, acts, news reports and websites of energy agencies and companies are used in this report. During the initial stages of the research process, some challenges were encountered in finding topic-specific data. "Coal leakage" is not a very frequently used concept and "carbon leakage" mostly concerns industries other than electricity. We decided to focus on electricity generation in Finland and study how the EU-ETS, SDGs and Finnish political decisions affect it. In addition, we have a case study of Fortum in this report that represents the current carbon politics from a corporate perspective. We choose the sources to form a general overview about the role of coal-produced electricity in Finland. After the process, we can still say it is challenging to find data about coal or carbon leakage. Others have probably encountered challenges in carrying out research for example, because of business secrets and prevailed political actions.

The literature regarding EU-ETS is quite vast and easily accessible although, when digging deep into the material, it is harder to find concrete data and examples of coal leakage due to the fact that it is both, to some degree, difficult to measure and surrounded by some secrecy. The direct linkages and spillover effects are therefore not so easy to find literature about, but the theory behind it is more accessible.

Familiarizing with the SDGs and especially indicators related to our topic was more difficult than expected, because there are global SDGs and targets which differ from the more narrowed targets that also have measurable indicators. Also, there wasn't much literature concerning the spillover effects, at least related to our topic, so these were more conclusions based on our background-research and knowledge.

In the process of researching the Fortum case study, good use was made of resources provided by advocacy groups fighting for a cleaner, and more ethically responsible, coal supply chain including Hiilivapaa Suomi, Urgewald and Europe Beyond Coal. These resources provided a helpful overview of the key debates and issues in the topic, but it was recognised that their strong political leaning might lead to a certain level of bias. To remedy this, web pages, conferences and statements by Fortum and Uniper were explored to observe the other side of the argument, so to speak. In addition, a range of news providers were searched for reports on the topic. Since this is a very contemporary issue (Fortum have only finalised the purchase of Uniper shares in the past couple of months) it was difficult to find academic literature on this specifically. Nonetheless, it was felt that the materials available provided a firm basis upon which to begin asking the right questions, if not to find all the answers just yet.

Discussion

EU-ETS and the Nordics

The European Union Emissions Trading Scheme (ETS) arose following a long process of agreeing on a market solution for reducing emissions in the EU. Previous attempts at introducing a carbon tax and the need to develop a new strategy after the Kyoto Conference of Parties under the UNFCCC led to the member states of the EU agreeing on the ETS. The ETS is the world's largest emission-trading system and was the first when it came into effect in 2005. It is now seen as the cornerstone of the EU's strategy to combat climate change (European Commission, 2019).

One of the fundamental principles of the ETS is what is called "cap and trade". This means that each participating country has a maximum amount of emissions it can emit - the cap - and if there are emissions to spare, these quotas or allowances can be traded within the system. Built into the ETS, there are also penalties to ensure the achievement of emission reductions (Convery, F. J., 2009).

One of several sectors that are included in the ETS is electricity production. As the goal of the ETS is to reduce the emissions in different sectors and total in different phases, for the energy sector this means reducing the emissions over several years, mainly by stopping using high-emissions sources of energy and replacing them with a greener alternative. In this article, we will be looking at whether the reduction in emissions through the ETS simultaneously leads to a negative spillover effect by increasing the amount of coal-produced energy somewhere else - otherwise known as coal leakage.

Within the ETS, certain industries are allocated so called 'free allowances' giving the industries that are exposed to large external competition the opportunity to emit more. This is a policy designed to avoid carbon leakage - considering that a price increase in that sector would lead to a large increase of carbon leakage by production moving out of the country to a higher-emissions country (Nordic Council of Ministers, 2019).

As is argued by the Nordic Council of Ministers, the selection of which sectors receive free allowances is a political decision (Nordic Council of Ministers, 2019). What constitutes a large threat of carbon leakage? How much should the free allowances amount to? These are questions that are up for discussion and that can have a great effect on carbon leakage. Furthermore, as the Nordic Council of Ministers argue, differentiation between sectors in the Nordics are too small, leading to a lack of focus in the effort to hinder carbon leakage.

According to the Nordic Council of Ministers, the Nordic countries have a more intensive use of electricity than most other EU countries and the use of biofuels is also higher in the Nordics. In addition, a large part of the production industry in the Nordic region is based upon biofuels, with large biomass industries. This positions the Nordic countries at risk of a higher price of biomass due to the ETS regulations. So, the fact that there is both high intensity of use and production inputs puts the Nordics at a high risk - which could lead to carbon leakage.

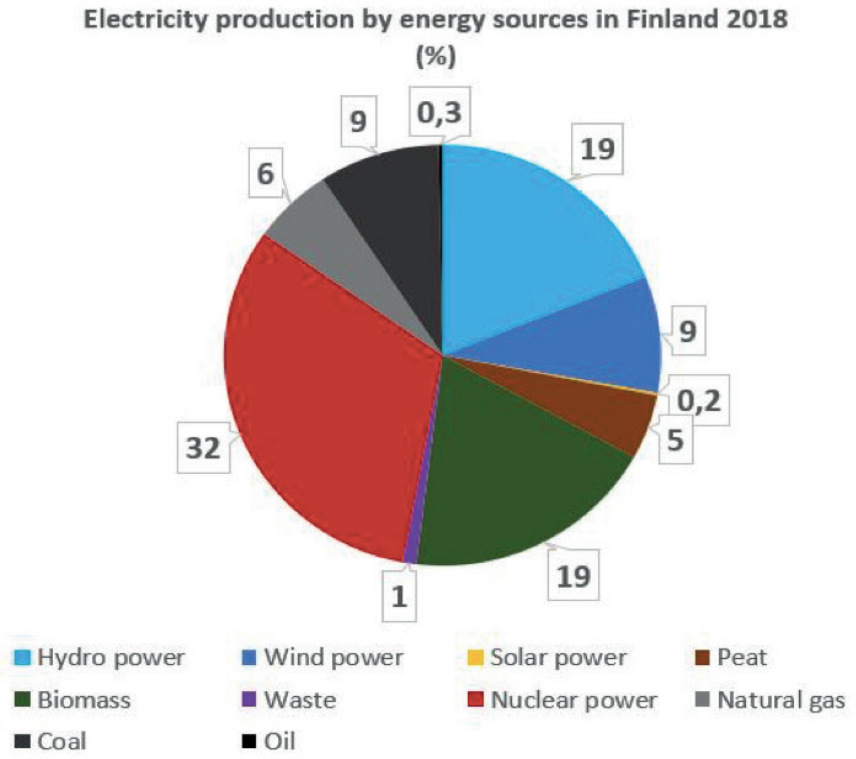

Figure 1: Electricity production by energy sources in Finland 2018 .(%)

Electricity generation in Finland

There are around 120 electricity-producing companies and around 400 power plants in Finland. More than half of those are hydropower plants, but the utilization ratio of plants depends on the water-level situation, and replacement energy by using coal and other fossil fuels is occasionally needed (Sähköntuotanto, 2020). Cogeneration Heat and Power (CHP) has been used in many residential areas in Finland. This is a method in which generated electricity produces heat which is then used to warm buildings through the district heating network (Ministry of Economic…, 2019). One third of generated electricity has been produced using the CHP method that it enables up to 90% efficiency of used fuel (Sähköntuotanto, 2020).

Most of the electricity used in Finland has been produced in Finland. However, the share of imported electricity was 23% in year 2019 (Energiavuosi..., 2020). 86 TWh of electricity has been used in total in 2019 which is 1.7% less than in 2018. The pie chart (figure 1) represents the reference values in 2018 based on the data from Energiateollisuus (Sähköntuotanto, 2020) while in 2019, 27% of electricity has been produced by nuclear energy and 14% by hydropower (Energiavuosi..., 2020). According to Energiateollisuus (Energiavuosi..., 2020), 33% of the electricity generation was based on nuclear power and 19% on fossil fuels, while the total electricity generation was 67 TWh in 2018. Most of the electricity imported is from other Nordic countries (over 15%) and the remaining ca 8% is mainly from Russia. When familiarizing only with the CO2 emissions from power plants in Finland in 2019, most emissions are caused by the three power plants in Helsinki (Hanasaari B, Salmisaari B and Vuosaari B) and one in Suomenoja, Espoo (Laitoskohtaiset päästötiedot 2013-2019, 2020).

Finland has ambitious climate targets to be carbon neutral by 2035 and a fossil-free welfare society by the end of the 2030s (Programme of Prime Minister…, 2019: 3.1). Especially, the production of electricity and heat should be almost emission-free by then. Finland's Integrated Energy and Climate Plan (NECP), that was based on earlier climate strategies decided by the Parliament of Finland, represents the current national climate targets that includes, in addition to that mentioned above, the target of increasing carbon sinks (Ministry of Economic..., 2019). NECP determines that the share of renewable energy should be at least 51% by 2030.

Nowadays, Finland has challenges with carbon leakage in electricity production related to electricity import from Russia (Rosslowe, 2020; Selvitys..., 2020). According to the newspaper (Selvitys..., 2020), as well as the report (Rosslowe, 2020), over half of the imported electricity from Russia has been produced

using natural gas, which is a fossil fuel. In other words, it would be possible to calculate the following hypothesis: while 23% of the electricity production is imported in 2019 and ca 6% is from Russia, approximately 3% of imported electricity would be the carbon leakage electricity. However, more research would be needed to confirm the hypothesis, which is difficult because of the lack of open-data sources.

As noted, a crucial part of implementing the climate policy is how to replace the used fossil fuels while achieving carbon neutrality. There have been problems determining carbon neutrality and the carbon offsetting that means compensation of carbon emissions (Hiilineutraalisuuden pelisäännöt, 2015). These problems relate especially to companies who must determine at what point they have tried to reduce their emissions enough that they have the possibility to lean on carbon offsetting. According to Alhola et al. (2015), there are a couple of options to determine carbon neutrality. The first is that GHG emissions must be calculated while reducing as much as possible and compensating the rest of the emissions so that the net-emissions are zero. The second option is that there is no need to compensate after reduction of emissions to achieve the number of zero net-emissions.

In the newspaper (Selvitys..., 2020), a business expert recommends a global-level emission trading system to solve the carbon leakage problem. In addition, new carbon tariffs would steer industries towards more sustainable choices. NECP also presents some goals for energy supply. There is a need for: taxes for carbon dioxide caused energy, developing wood-based fuels e.g. using forest chips and promoting wind power, solar power and biogas in electricity and heat production (Ministry of Economic…, 2019). Moreover, two new nuclear power plants are estimated to start-up during the 2020s and these "will largely replace imported electricity" (Ministry of Economic…, 2019: 56).

Finland cooperates with other Nordic countries to achieve climate targets. The Nordic Council of Ministers is an organization that focuses on, amongst other things, electricity markets. The idea is to maintain common Nordic electricity markets that enable "the integration of renewable power generation, security of supply [and] demand flexibility and smart networks" (Ministry of Economic…, 2019: 20) Cooperation enables more comprehensive resources to improve energy-efficient and renewable solutions while it is easier to represent common Nordic opinions to the EU while making EU's political decisions. There is also the target for EU member states to maintain electricity interconnectivity to neighbouring EU countries, which has resulted in a couple of projects to build new electricity overhead lines in Finland (Ministry of Economic…, 2019). These projects enable better electricity connectivity e.g. to Sweden and integration of renewable energy production in Finland.

Electricity production and SDG indicators

There are several UN Sustainable Development Goals (SDG) that are affected by electricity production and carbon emissions and vice versa. However, the affected goals and targets vary a lot between scales and locations. In the context of Finnish electricity production and emissions, the central goal is SDG 7: Affordable and clean energy, whose main targets are to ensure access to affordable, reliable and modern energy, increase energy efficiency and the share of renewable energy. The indicators measuring the progress in SDG 7 are: access to electricity, use of clean fuels and technology for cooking, CO2 emissions from fuel combustion divided by electricity output (MtCO2/TWh) and share of renewable energy in total final energy consumption. Also, in Goal 12: responsible consumption and production, there are indicators connected to emissions, such as production-based SO2 emissions (kg/capita) and imported SO2 emissions (kg/capita) – SO2, sulfur dioxide is a by-product from burning fossil fuels – and in Goal 13: climate action, there are indicators such as imports of CO2 emissions embodied in goods, measured as technology-adjusted, consumption-based (TCBA) emissions minus production-based emissions and effective carbon rate from all non-road energy, excluding emissions from biomass (€/tCO2). (Sachs et al., 2019)

As can be seen above, many indicators are connected to electricity production and emissions, but they are quite specific and concentrate on rather visible issues. For example, the indicators do not take into account the risk that nuclear power plants pose to the environment. Also, wood-based fuels are counted as renewable energy sources, although they are not completely clear as using wood-fuels also causes emissions and the forest industry reduces carbon sinks.

Fortum: a case study

The Finnish state-owned energy company, Fortum, recently became the largest and majority shareholder of German energy company Uniper (Kaurenen &

Steitz 2019). Uniper's carbon emissions in 2018 were larger than those of the whole of Finland (Uniper, n.d.; 'Statistics Finland, 2019). This purchase has led to criticisms by environmental groups that Fortum is 'riding on two bicycles' (Hiilivapaa Suomi, n.d.): running an advertising campaign that promotes the need for a cleaner world (Fortum, n.d.) whilst simultaneously becoming one of Europe's largest indirect emitters of carbon with the Uniper deal (Moore et al., 2018). Furthermore, Fortum CEO Pekka Lundmark, has expressed his support for the opening of Datteln 4 - a new Uniper coal power plant in Germany (Holmberg et al., 2019: 9). Uniper has also threatened legal action against the Dutch government for its plans to phase-out coal (Keating, 2019).

Uniper's plans for the Datteln-4 coal power plant have met with significant opposition from environmental groups (Ende Gelände, 2020). This is namely because, as studies have shown, in order to reach the 1.5 degree target, coal needs to be phased out in the EU and OECD countries by 2030 (Rocha, M. et al., 2017). Germany however, has set a target of coal phase-out by 2038, which Lundmark has used as justification for his support for Datteln-4 (Holmberg et al., 2019: p9). Another justification by Fortum is that Dattel-4 will replace less-efficient existing coal power plants in Germany, but their utilisation rate is currently, relatively low – lower than Datteln-4's is predicted to be (Fraunhofer ISE, 2020). Furthermore, a Greenpeace Germany survey found that 68% of Germans oppose the plans for Datteln-4's opening (Greenpeace Suomi, 2020).

Fortum is relatively transparent about its usage of coal. It's website states that it currently imports coal from Russia for use in Finland, as well as using Polish coal in Poland and Russian and Kazakhstani coal in Russia (Fortum, n.d.). Their main suppliers are SUEK, Maikuben-Komir, Polska Grupa Górnicza, Kaproben and Kuzzbassrazrezugol/Carbo One (ibid). Uniper are somewhat less transparent, revealing that they source coal from Russia, Colombia, USA and South Africa as well as 15% from unknown sources and 7% from 'other' sources (Urgewald, 2020). The Russian coal comes predominantly from the Kuzbass region, which has faced numerous detrimental health and environmental impacts from coal mining (Bennets, 2019). These include toxic black snow, above the national average rates of cancer, child

Urban area confronts nature. Photo: Sari Aroalho

cerebral palsy and tuberculosis and below the national average life expectancy (ibid). Furthermore, the majority owner of Kuzzbassrazrezugol - Iskander Makhmudov - has been accused of organised crime and money laundering through Swedbank accounts linked to himself and Carbo One, which is the trading company of Kuzzbassrazrezugol (Down, 2019).

Both Uniper and Fortum are members of the Bettercoal initiative, which aims to 'work towards a global responsible supply chain' (Bettercoal, n.d.). But only 46% of Uniper's coal in 2018 came from suppliers that had signed up to the Bettercoal code of conduct (Urgewald, 2020) and only 66% of Fortum's in 2019 (Fortum, n.d.). Furthermore, Bettercoal has come under criticism from environmental groups for not taking seriously enough human rights violations, for example in Colombia (Urgewald, 2020).

This case study can be used to argue a number of points. Firstly, the negative spillover effects brought about by coal leakage go beyond increased or exported carbon emissions - we have seen human rights violations and direct damage to local environments too. Arguably, the longer and more complex the global coal supply chain becomes, the harder it is for companies like Fortum and Uniper to ensure the ethical integrity of their sources.

Additionally, we are confronted with a broader issue of accountability. We have seen how Fortum brands itself as a clean energy company, and yet is the majority owner of one of Europe's biggest emitters of greenhouse gases (Moore et al., 2018). Fortum itself is 50.76% owned by the Finnish government as of the end of 2019 (Fortum, n.d.) which leads us to question whether Finland can really claim to be world leader on climate under these circumstances. At a 2018 conference, when asked about Datteln-4, Lundmark, as we have seen, gave his approval but finished his answer by saying …"but more into details I do not want to get into – please discuss this with Uniper" (Holmberg et al., 2019: p9). But as the majority shareholder, can he really claim that this Uniper's issue and not Fortum's? By definition, the Fortum/Uniper case study falls outside the issue of carbon leakage, since Fortum is not directly sourcing coal from Uniper. Thus, we would argue that there is need for another conceptual framework and accountability mechanism that holds not just companies, but shareholders and investors, responsible for carbon emissions, environmental degradation, organised crime and human rights violations in the coal supply chain.

Spillovers

Electricity production and carbon emissions affect many areas of human life and societies, but the effect varies highly between different locations. For example, in areas where having electricity in the house is not a self-evident fact, shortage of electricity might cause inequality between people, because it usually falls on the poorest. Compared to Finland for example, where everyone has access to electricity (at least according to SDG measurements), it doesn't affect social issues so clearly, but behind the production supply-chains, there can be other huge issues, as mentioned in the Fortum-Uniper case. According to SDG Index on estimated negative spillover effects (Sachs et al., 2019), Finland's score is 67.1 of 100, so there is still a lot of room for improvement.

In the Finnish context, electricity production has more direct interlinkages to environmental issues such as emissions and resources, which we have focused on more in this report. It is clear, that electricity production needs resources and produces emissions, but as the SDGs also state, it should be produced efficiently and with minimal emissions. This does not happen easily, as electricity is essential to industries and people, so the demand is always rather high, especially in Nordic countries, where heating is essential, especially during the cold seasons. Renewable energy is highly dependent on the weather conditions and water situation, so supply does not always meet demand, following that electricity and heat also need storage opportunities and additional sources.

As mentioned before, nuclear energy is the biggest energy source produced in Finland after renewables then fossil fuels and peat. Although use of coal in electricity production is decreasing, it doesn't mean that use of fossil fuels would decrease. For example, in 2018 use of fossil fuels in electricity production grew 11% and peat 25% from 2017. Increase in the use of fossil fuels was mostly due to an increase in the use of natural gas and decreased supply of hydropower. Due to increased use of fossil fuels, greenhouse gas emissions also grew. (Statistics Finland, 2018) In addition, a gas pipeline was opened between Finland and Estonia in the end of 2019, which connects the Finnish and Baltic states gas markets and which will later enable integration into EU's common energy markets (Baltic Connector, 2020). It's important to notice that not all gas in the markets is fossil natural gas and greener biogas is potential energy source, but it's use in Finland is still very limited. Increasing use

of natural gas is a risk to climate as it might cause so-called methane leakage. Although natural gas is less carbon intensive than, for example coal, and methane remains in the atmosphere for a shorter time, it absorbs more energy than carbon, so it warms the atmosphere more efficiently (IEA, 2020). Often the largest emissions and leakages occur at the beginning of the supply chain, so the issues are not so easily seen in the end products, which are often under observation when measuring emissions or other target indicators.

Conclusions

According to the Ministry of Economic Affairs and Employment (2019), there will be challenges related to peak-load situations of electricity demand even though electricity network and interconnectivity will be improved in the future. Thus, there is a need for research that solves the issue of how to shift towards a real fossil-free society while demand for electricity increases and energy-efficiency is more challenging to achieve with renewable energy sources. In addition, there is a need to determine carbon neutrality and what are the common practices to achieve it, with or without compensation mechanisms.

The direct effects of EU-ETS on carbon leakage, and coal leakage in particular, need more research. The data that can be found at the time of writing is not vast, and more studies should be done to properly be able to compare the effects on different countries and different markets.

Skyline, City of London. Photo: Julia Viertola

Availability of data related to carbon or coal leakage is limited, especially when narrowing down the topic to apply to Finland. The availability depends on the energy companies and, on the other hand, political decisions about how wide an access to data researchers should have to form truthful decisions about climate actions. Based on the available data, we found out that the situation of coal-use in electricity generation in Finland is relatively good compared to the global level, while Finland has used coal the most compared to the other Nordic countries. In addition, based on the limited range of sources that we have, the hypothetical share of carbon leakage of total generated electricity used in Finland would be approximately 3% today. The share relates to imported electricity generated by natural gas in Russia that is not part of emission trading schemes. However, Finland cooperates with other Nordic countries and has ambitious climate targets which will prohibit the use of coal in electricity and heat production by 2029. The situation of natural gas consumption in electricity generation should be studied more in the future, especially because it can be expected to rise due the new connections to Baltic markets.

This is where the Fortum case study becomes crucial. As Fortum has made it clear, one of their motivations for the Uniper purchase is increasing access to natural gas resources (Hyvärinen, 2019). This raises the question of whether current coal leakage may be replaced by gas leakage in the future, which despite being less polluting than coal, is still a fossil fuel. As we have seen, the Fortum case study raises other important questions about the issue of 'leakage' beyond carbon emissions. Above all, it demonstrates the high levels of international connectivity and complexity in fossil-fuel supply chains, and how viewing these issues through a national framework can be somewhat limiting. Since climate change does not respect national borders, it seems somewhat counterproductive for our collective response to be limited by them – and as such, transparency in supply-chains as well as robust responses to spillover effects are of paramount importance.

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The impact of the EU's agricultural policy on West Africa

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Photo: Sari Aroalho

Introduction

The European Union (EU) wants to be seen as a global player in the sustainable development scene. The UN Sustainable Development Goals (SDGs), are according to the European Commission "our shared roadmap for a peaceful and prosperous world" (European Commission, n.d.-a, "EU approach to sustainable development"). One important aspect of the SDGs is that they ought to be seen as multilateral and global. This report will be mainly looking at the multilateral relationship between the EU and members of the Economic Community of West African States (ECOWAS). Further on in this report, the area will be referred to as West Africa.

The EU committed over 58 billion euros to agriculture and rural development in their budget from 2019 (Definitive adoption (EU, Euratom) 2019/333 of the European Union's general budget for the financial year 2019). The majority of the sum, a total of 40 billion, consists of direct payments. To put this in perspective, 40 billion is more than the total annual GDP of a small country. Estonia, for example, had a GDP of less than 30 billion in 2018 (World Bank, 2019). The EU has a great interest in supporting the farmers of Europe but also admits that it impacts Global South (Blanco, 2018). This report analyses these impacts from an economic, environmental, political and social perspective.

Aim of report

The aim of this report is to analyse the relationship between the EU's agricultural policies and the effect they have had on West African societies. This relationship is complex and in this report the focus lies on a specified geographical extent, West Africa. The geographical viewpoint allows for area-specific conclusions about spillover effects. There is no guarantee these effects are relevant in other areas, but there is definitely a need for researching this in other regions; we can see for example, that the EU biofuel policy has caused a loss of natural habitats in both Brazil and some Asian countries (Prins et al., 2011). So, there is reason to suspect EU's agricultural policies affect other parts of the world as well.

It is important to analyse the impacts of the EU's agricultural policies, since it is a large amount of the total EU budget and also because the EU and its member states are committed to the implementation of the SDGs. For a long time now, the policies made by the EU have been criticised by various media outlets, see Tran (2011) and Livingstone (2018), to name a few. Spillover effects are not always easily identified and this report aims to give a broader overview of how West Africa is being affected. It is good to bear in mind that the SDGs are global, and that the whole world is trying to overcome the common problems that the world is facing. If the EU's agricultural policies are causing problems for West Africa in achieving the SDGs, that means that it is counterproductive. Therefore, it is crucial for analysing the spillover effects that these policies have, so that the common SDGs can be met by the global community by the year 2030.

Materials

The materials in this report consists of various sources. The main source consists of academic articles and official reports made by established institutions, such as the EU. This report also includes sources from trustable news media. The chosen approach seemed reasonable, since there is a lot of information available in academic journals and reports about the subject. Another argument for using an approach that includes both reports by institutions and news articles is, that it gives a broader perspective on the issue.

Discussion

EU's Common Agricultural Policy

The Common Agricultural Policy (CAP) is the agricultural policy of the European Union. It supports farmers and ensures Europe's food security, implementing agricultural subsidies and other programmes. Regional inequalities have existed between Western European countries and Central and Eastern European countries that were less developed with relatively many rural areas. Members of the European Economic Community (EEC), founded by the Treaty of Rome at the time in 1957, recognized that it is difficult to achieve the goals of the common market with acknowledging the importance of agriculture in terms of employment and the need to improve the income of the agriculture sector, and the individual intervention of the governments of agriculture.

In 1962, EEC introduced the CAP in the agricultural field and three major principles of the CAP

had been established: market unity, community preference and financial solidarity. The CAP was the first common policy of the EU and since then and has been an important position in the European institutional system. It made a significant contribution to European integration. In addition, the CAP played an important role in the policy of income redistribution among member countries. It is managed and funded at European level from the resources of EU's budget. After several reforms, the CAP's budget was reduced from 73% of EU's total budget in 1985 to 37% in 2017 but it still occupies the largest category (Parliamentary Budget Office of the Houses of the Oireachtas (Irish Parliament), 2018).

The CAP is a partnership between Europe and its farmers, and between agriculture and society. It aims to: 1) support farmers and improve agricultural productivity, ensuring a stable supply of affordable food, 2) safeguard European Union farmers to make a reasonable living, 3) help tackle climate change and the sustainable management of natural resources, 4) maintain rural areas and landscapes across the EU, 5) keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors.

The CAP provides direct subsidies for farmers producing any commodity on their land except fruit, vegetables and potatoes through subsidy policies such as minimum price guarantees and import tax on certain goods outside the EU. Direct subsidies are provided as follows: 1) to keep their land in good agricultural and environmental condition, 2) to contribute to the development of agriculture, such as diversification and establishing a farmer union, 3) to operate farmland that contributes to the environment.

In assessments of the CAP performance, it is positive that the CAP has greatly contributed to the stabilization of agricultural product prices within the EU and the modernization of agricultural management. However, on the negative side the CAP has been criticized that the CAP's subsidies lead to distortions and inefficiencies in resource allocation, which hinders the growth of developing Global South and limits structural changes and innovation in the agricultural industry of the EU. According to European Committee of the Regions (2019), the CAP subsidies "lead to countervailable subsidies or dumping where the former refers to price suppression and lost sales by other countries, and the latter to export sales below the cost of production in the EU" (p.1). The subsidies of CAP continue to have a production-stimulating effect in spite of the CAP reform path for recent decades (European Committee, 2019).

To cope with the criticism and new challenges, the Common Agricultural Policies has been continuously pursuing reforms. The CAP, which was planned to attain self-sufficiency of food in a situation of food security and support farmers' stable income, led to an overproduction of agricultural products and serious budgetary problems for the EU. In the 1980's, the costs for stockholding and export subsidies were rising, which triggered a first serious reform aimed at redressing the system deficits (Fritz, 2011). The European Commission (n.d.-c, para.9) noted the timeline of the CAP reform and it shifted support scheme from market to producer in 1992. Price support was scaled down and replaced with direct payments to farmers, encouraging them to be environmentally friendlier. In this year, the reform coincided with the 1992 Rio Earth Summit, which established the principle of sustainable development.

In 2003, the CAP reform cut the link between production and subsidies and provided income support. Farmers received income support on condition of looking after the farmland and fulfilling food safety, environmental and welfare standards. The 2013 CAP reform aimed to strengthen the competitiveness of the agricultural sector, to promote sustainable farming and innovations, to support growth and jobs in rural areas and to move financial assistance towards using lands productively. At the same time, Common Monitoring and Evaluation Framework (CMEF) was established with the aim of measuring the performance of the CAP implementation for 2014-2020. In 2018, with higher ambition of environmental and climate actions, the European Commission presented that after 2020 the CAP will continue to ensure access to high-quality of food and strong support for the unique European farming model, based on nine objectives: 1) to ensure a fair income to farmers, 2) to increase competitiveness, 3) to rebalance the power in the food chain, 4) climate change action, 5) environmental care, 6) to preserve landscapes and biodiversity, 7) to support generational renewal, 8) vibrant rural areas, 9) to protect food and health quality (European Commission, n.d.-b, "Legislative proposals" para.2)

EU's Common Monitoring and Evaluation Framework

The European Commission evaluates and monitors CAP through common monitoring and evaluation framework (CMEF). The CMEF includes different kinds of rules, indicators and procedures and it is used for assessing the performance of the CAP and improving its efficiency. According to The European Commission (2015, 5) the CMEF "*--will provide to administrations, and to all those interested in agriculture and rural development, key information on the CAP implementation, on its results and on its impacts.*"

Monitoring and evaluation are two different, but mutually complementary, functions. Monitoring is a continuous process, that produces quantitative data of, for example, budgetary inputs and the implementation of instruments. In other words, monitoring tells what the current state of a certain process is and demonstrates the progress of the policies. Evaluation, in turn, explores the results, effects and impacts of interventions. The aim of evaluations is to provide evidence for decision-making and improve the effectiveness of CAP (European Commission, 2015).

The three main objectives for the CAP 2014-2020 are:

1. Viable food production: to contribute to food security by enhancing the competitiveness of EU agriculture while providing the means to address the challenges faced by the sector related to market disruptions and the functioning of the food chain.

2. Sustainable management of natural resources and climate action: to ensure the long-term sustainability and potential of EU agriculture by safeguarding the natural resources on which agricultural production depends.

3. Balanced territorial development: to contribute to the socioeconomic development of rural areas, while fostering the right conditions for safeguarding structural diversity throughout the EU (European Commission, 2015).

The core purpose of the CMEF is to assess whether the CAP is achieving these goals. In order to be able to monitor and evaluate these broad main objectives of the CAP, the objectives need to be broken down into smaller sub-objectives that can be measured with the help of indicators. The CMEF includes two types of

Vineyards in Europe. Photo: Sari Aroalho

indicators. The first ones are performance indicators, which contribute to the assessment of the performance of the CAP. Performance indicators measure, for example, employment rates of primary sector, greenhouse gas emissions, EU's share in global agri-food exports, labour productivity in agriculture and numerous other phenomena related to the performance of CAP. Performance indicators exist at three different levels: output indicators, result indicators and impact indicators (European Commission, 2015).

The other indicator type is context indicator. Context indicators provide information on socio-economic, sectorial and environmental trends that are likely to have an impact on the implementation, achievements and performance of the CAP. There are all together 45 context indicators which provide information, among other things, on population, poverty rates, agricultural area, land cover, farming intensity etc. (European Commission, 2018).

The information gained from monitoring and evaluation is supposed to improve the future policies. However, improvements are made only from the European point of view. The main objectives of the CAP, as well as the indicators that measure the performance and effectiveness of the policy, concentrate solely on the effects and achievement in the EU area, and the other parts of the world are not considered. In other words, the EU's official monitoring and evaluation tool for the CAP totally ignores the spillover effects. The EU and its member states are committed to Policy Coherence for Development (PCD). The aim of the PCD is to take the development objectives into account in policies that are likely to affect developing countries. PCD is recognized as a crucial instrument to achieve the Sustainable Development Goals. The goal is that the PCD is applied across all policies (European Commission, 2019). Yet, the PCD does not cover the CAP.

A cross-cutting study report of the impact of the CAP in Global South has been published in 2018 by the EU. The report states that for the last two decades, strong progress towards PCD has been made, but more systematic impact assessment of the CAP's external effects is needed. The impacts of the CAP on EU agriculture are assessed and evaluated systemically with consistent methodology, whereas external effects are only roughly estimated through review of relevant studies. To be able to align the CAP with the SDGs, specific PCD indicators are needed. In addition, the complex interaction between different policy sectors as well as EU's and countries' in Global South policies should be better considered (Blanco, 2018).

Impacts of the Common Agricultural policy in West Africa

In the case of the West African states, the European Union is the region's most important trading partner in both imports and exports. The EU member states absorb 43% of the area's agricultural exports, and 48% of its total food exports. Likewise, the EU is also the main trading partner in imports. It covers 23% of the area's agricultural imports and 22% of food imports. (Torres & van Seters, 2016.) However, in general the countries in Sub-Saharan Africa have diversified their networks of import source countries and export destinations over the years, as the EU's shares of the total trade for the region have fallen 10% for imports and over 20% for exports between 1995 and 2012 (Matthews, 2014).

There is a lack of diversification in exports of agricultural products in the West African countries, with the main products being cocoa (with 44% of total agricultural exports), rubber and cotton. (Torres & van Seters, 2016.) Agricultural exports of each country are heavily reliant on just one to three products. This dependency leads to vulnerability to fluctuation in global market prices and is considered to be a remnant from the colonial days. Additionally, a lack of diversification in agricultural exports can lead to increased vulnerability to the effects of climate change (Blein et al., 2008).

EU's use of export subsidies has also been an issue in Africa, as the Union's export surplus is dumped on the local market, with the consequence of distorting product prices. Local farmers struggle to compete with the prices, and the situation puts their livelihoods at risk. However, this phenomenon also has positive effects for the average consumer, as subsidized products from the EU increase food availability and reduce prices, especially for the urban areas (Matthews, 2014). Nevertheless, in the words of one of the most notable critics of CAP, Ghana native and former UN secretary general Kofi Annan, "We are a continent with all the land, with lots of unemployed, lots of small-scale farmers, most of them women, and yet we import 85 billion dollars of food per year" (Tefer, 2017).

The use of subsidies by the EU and other countries such as the US means that surplus products is often sold cheaply in third world markets such as those in West Africa, creating distortion in food prices which affect the native farmers the most. The types of agricultural products which are distorting markets in West Africa includes wheat produced in Britain exported to Nigeria and Senegal, powdered milk from the EU exported to Mali and chicken thighs and wings exported to Senegal and Ghana (a demand which was previously met by local farmers which now only supply 11% of the market) (The Independent, 2006). From these figures we can see that exportation of surplus products leads to a reduction in the number of farmers in native countries.

European Union abolished the milk production restrictions it had imposed on each member state in 2015, which led to increased dairy production, especially in the countries that export dairy products to West Africa. The countries with the largest projected production growth are Ireland, the Netherlands and Germany. The main export product for the West African market is milk powder. The production chains European dairy companies are creating in West Africa engage local industries very little and mostly for packaging and distribution, while engagement with local milk producers remains marginal. The increased dairy exports from the EU may discourage local governments from attempting to develop the local dairy sector. (Orasmaa, Duteurtre, Corniaux; 2016.) European dairy producers have also been accused of dumping lower quality produce on the African market, as skimmed milk powder mixed with palm oil has been rapidly expanding its market share in West Africa in recent years. The product is more affordable, but it has fewer nutritional benefits and consumers are often unaware of the actual contents due to lacking labelling laws. (Marks & Livingstone, 2019.)

An environmental impact not seen in West Africa, but which occurs in countries with subsidised farming is intensive farming practices which are known to be environmentally damaging due to the use of chemical pesticides among others. This is due to the security of fixed prices for their product, making it more economically viable for farmers to use all available land for increased profit (The Guardian, 2003). This practice is attempting to be curbed by the EU with the introduction of schemes to encourage land fallow and meeting environmental standards, however overproduction still remains an issue. An environmental impact, which can be seen in much of modern agricultural distribution practices globally, is the buying of large carbon footprint products and the lack of locally sourced products. As part of the SDGs climate action goal, all countries as part of reducing their carbon footprint should be reducing unnecessary transportation of food products, and one would argue that forcing local farmers out of business prevents this goal from being achieved.

The environmental impacts in West Africa, caused by EU's agricultural policies have not been thoroughly researched. The climate crisis is a global problem, and pollution emitted in one country will not stay within the borders of that country. Additionally, the lack of diversification in agriculture in West Africa will pose a problem in the face of climate change. It is possible that EU's agricultural policies might have a big spillover effect in West Africa and the relationship needs to be further investigated.

Social impacts vary depending on location and agricultural sector, but most are attributed to the loss of a farm and hence income. In an interview with a Cameroon chicken farmer, Fritz writes that due to the competition of low-priced products on the market, the loss of their business meant a knock-on effect to their children's education, and also a financial strain of having unpaid debts (Fritz, 2011). Such social impacts reported here could link to other unreported impacts that link SDGs such as quality education and gender equality. If we look at the potential impacts of farms closing more generally, the effect it would have on the community could include the likelihood of ex-farming families leaving an area to find work in cities, and this could impact communities due to reduced number of services (shops, transport links) should the number of people in an area reduce greatly. Also, thinking of the emotional cost to families and the communities, since the farming family referenced in Fritz report held the farm since 1995 and lost it around 2002, and it would not be surprising if generations of farming families were lost due to farm closures (Fritz, 2011).

The pressure on African agriculture and the sector is not limited to the EU's CAP scheme; pressure from the WB and IMF to make African nations make free trade rules (scraping their own tariff and subsidies schemes) in exchange for loans only makes the spillover effects from CAP more damaging to African nations' economies (The Independent, 2006).

Boy bicycling between corn fields. Photo: Julia Viertola

When looking at a country's agricultural sector, you have to bear in mind food security. Looking at the current global food situation due to COVID-19, you can see food shortages in products such as pasta as this product is produced in other countries (such as Italy) which are now no longer producing, leading to a reduction in this product in other countries. Should the EU stop exporting foods in amounts which these countries have come to rely upon, this could create food shortage in certain products, which could affect various areas of the country (such as economy, productivity). Food security is highest when the products which a country needs are produced within its borders, and the CAP is preventing this which could lead to serious implications for a country's general security.

Future aspects

The current CAP will end by 2020 and the new CAP for 2021 to 2027 has been proposed. This CAP beyond 2020 is meant to be "more responsive to current and future challenges such as climate change or generational renewal, while continuing to support European farmers for a sustainable and competitive agricultural sector" (European Commission, n.d.-b., "Legislative proposals" para. 1). The future CAP will be based on 9 objectives, none of which take into consideration the spillover effects of these policies in developing countries. These policies are meant to be better for the adaptation that will come with the current climate crisis. CAP 2021-2027 will keep agriculture in the EU competitive. There seems to be little consideration of how the new policies will affect West Africa. For the agricultural sector in the EU, the new CAP will be a reassuring support and perhaps it will also be successful in keeping European landscapes green, but so far, the West African landscapes are being neglected.

There have not been many papers published with reflections over what the new CAP will bring. Some voices from the development sector have been heard and pointed out that there is a lack of coherence with EU's agriculture policies and their stand on development and human rights (Barbière, 2019). A clear understanding of what the future brings is hard to determine, but we can determine that the aim of the EU's new CAP strategy is to keep the European agricultural sector active and as an important player in the international agricultural scene, also in the future. West Africa, with less institutional corporations

in the agricultural sector and much smaller assets and weaker agricultural intensification strategies than the EU, is going to continue having a difficult situation in keeping the agriculture sector alive.

On the other hand, there are a lot of opportunities for West Africa in the future. The Food and Agriculture Organization of the United Nations (FAO) reports that food security has increased in West Africa since the 1990's (Hollinger, 2015). Overall the report shows that the potential for West Africa is large. The economic stability is increasing and if some assets are put in place for developing the agricultural sector, the region might stand much stronger against the agri-food imports from the EU and other parts of the world where they can afford to support the agriculture.

Conclusions

The EU has taken an active role in shaping the 2030 Agenda for Sustainable Development, and therefore the CAP reform was expected to fortify achieving SDGs. Additionally, future reforms were expected to be more coordinated with policies on trade, development and the environment, as the Union has been criticized for incoherence between policies in the past. (Blanco, 2018) However, from the most recent proposal of CAP 2021-2027, it seems that spillover effects on the developing world will largely be ignored by policymakers (European Commission, n.d.-b., "Legislative proposals" para. 1)

The spillover effects of the EU dumping its surplus agricultural products on West African markets may become tangible in the coming months, as the COVID-19 crisis is expected to disrupt supply chains and agricultural production, leaving countries that rely heavily on food imports at risk. In situations such as this, local agricultural capacity becomes vital (Dahir, 2020).

Overall, the amount of data we have found shows that, at least, the economic spillover effects of the CAP are documented (mainly by NGOs) and that the EU has recognised and tried to implement changes to the policy due to global scrutiny. Although the changes are being made, one would argue the lack of documented social impacts and impacts other than economic ones shows a lack of regard for data concerning African farmers and the impacts the CAP has caused them. We would argue that research needs to be done to document these effects, and that focus should not rest solely on economic impacts.

It is therefore unsurprising that concerns raised in this report are all brought up in the executive summary of the EPs Policy Department, Directorate-General for External Policies report on The impact of the Common Agricultural Policy on developing countries from 2018 (Blanco, M. 2018).

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Global impacts of the European fashion industry

Alisa Redding, Theresa Riedel, Ida Roikonen

Photo: Sari Aroalho

Introduction

Is the age of the sweatshop in the past? (BBC 2019)

Primark and the high street: Why are the workers who make our cheap clothes paying with their lives? (The Independent 2013)

Do you know what's happening to your clothing donations? (Washington Post 2020)

These questions concerning fashion are normally not part of our everyday life but need to be faced in order to accomplish the Sustainable Development Goals (SDGs) of fighting poverty, diminishing pollution, and other important topics of our time. Through its sourcing, production, and consumption the fashion industry has one of the widest global distributions and a quite high (economic) significance worldwide (Baden & Barber 2005). It is responsible for 8-10% of the global greenhouse gas emissions, 20% of the global industrial wastewater pollution, and an approximately 500 billion euros are lost every year due to the lack of recycling and underutilisation of clothing (UN Alliance for Sustainable Fashion).

The (fast) garment industry provides cheap, low-quality, trend-based clothing to consumers. In order to do so, the companies use unethical, exploitative, and cost-cutting methods to lower their production costs and maximize their profits. Supply chains and productions have been outsourced to cheaper labour countries and the workers suffer from long working shifts, low wages, and inhumane working conditions (Lambert 2014, CCC et al. 2015).

Aim of report

The following report aims to give an overview of all the different aspects concerning the fashion industry and its supply chains, focussing on its environmental and social impacts. Furthermore, it critically analyses how the SDG's are targeting this industry and tries to work out which aspects might be missing. Through a short case study, the report examines the development of H&M towards a more sustainable supply chain and tries to analyse the current state of the company to fulfil their aims also considering the SDGs.

Materials

The main body of work that is conducted for this report is a literature review of studies over the quality and quantity of the fashion industry. The literature chosen consists of investigative journals, official intergovernmental studies, reports by non-governmental organizations, campaigns, and documentaries. The range in literature allows the report to cover multiple perspectives on the industry and report any inconsistencies that arise especially in international governmental reports.

Difficulties arose when looking for studies and articles concerning the spillover effect and SDGs of the second-hand clothes (SHC) trade. It seems that the SHC trade is not directly seen as part of the fashion industry and therefore is not further analysed. Moreover, the literature reviewing the sustainable development of H&M critically were mostly published by humanitarian organisations. Other studies by researchers took the H&M website itself as a reference and were praising - sometimes without looking at other studies - the improvements H&M published on their own website.

Discussion

SDGs for Fashion

In 2015, the UN released the 2030 Agenda for Sustainable Development, a comprehensive plan for countries to follow in order to decrease the overall negative impact on the planet. SDGs cover many factors, besides environment, also education, employment opportunities, gender inequalities and country infrastructure. While a reduction in negative spillovers is not an individual goal of the 17 SDGs, they affect the possibilities to realize Agenda 2030 globally. For example, a well-developed country cannot receive a perfect score in Goal 13 – Climate Action – if they continue to pollute less developed countries by shipping their waste there. The spillover impact is an essential factor in constructing a more accurate image of a country's performance in sustainable development, and especially in analysing the global impact of Europe's fashion industry.

Few SDGs explicitly outline indicators relevant to the fashion/garment industry. Under SDGs for Better Fashion (SDG Action#28041) four goals are listed. Goal 4: Ensure inclusive and equitable quality edu-

cation and promote lifelong learning opportunities for all. Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Goal 12: Ensure sustainable consumption and production patterns. Goal 13: Take urgent action to combat climate change and its impacts. The aim of this project is the "implementation of sustainable design strategies, promoting the use of sustainable technologies and appropriate resource management throughout the textile supply chain, proposing new business models and engaging with consumers for better consumption habits" (SDGs for Better Fashion).

However, the implementation of methodologies is lacking. Students and companies are given lectures and exhibitions are open to the public. In terms of impact, these methods are weak. An even further look into their deliverables and timetables reveal very low impact with engagement in three public events totals, outreach to 100 students through a fashion workshop, and a free webinar offered to consumers. This action plan does nothing to address systemic issues in the supply chain, worker rights, or environmental degradation – to name a few. Additionally, this action plan fails to include other SDGs that would be relevant, namely; Goal 5: Achieve gender equality and empower all women and girls, Goal 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all, and Goal 10: Reduce inequality within and among countries.

Across the world, "women comprise the majority of the footwear and garment manufacturing workforce" (Ethical Fashion Report 2019). Therefore, discussions on living wages inherently involve a gendered perspective of women's equality and empowerment. And for the majority of workers, wages are so low that it leaves them, and their families, trapped in the cycle of poverty (Ethical Fashion Report 2019). Their work conditions differ depending on the company, factory, and country of where they work. Safety standards continue to improve but concern still remains over fire safety regulations and structural defects of the factories in where they work. Goals 5, 8, and 10 all can be applied to address these issues in the fashion industry.

Clearly the action plan is not large-scale nor attempting to implement global change, but few action plans exist with the fashion industry in mind. Will the appropriate SDGs be implemented without a cohesive action plan between countries and companies to improve working conditions, the supply chain, and environmental impact? And when the SDGs are implemented will they be done so by taking into account the perspectives and realities of workers or only what is officially reported? For many, the garment industry is their livelihood and direct criticisms of their working conditions may not be given publicly. Without honest or knowledgeable feedback about different steps along the supply chain, it will be hard to determine how effective any of the SDGs really are, and if they are being implemented. It is already an issue in factories that ethical working initiatives that are supposedly adopted are rarely ever followed. So how can we ensure accountability?

Launched in 2019, the UN Alliance for Sustainable Fashion attempts to address the multiple fashion-related spillovers of the industry by specifically working with fashion industries, organizations, and initiatives worldwide to implement SDGs. One such initiative is the Ethical Fashion Initiative that works directly with the UN Fashion Alliance and is partnered and supported by the European Union and the International Trade Centre, The EFI works "to contribute to poverty reduction by supporting the creation of sustainable and decently paid jobs for artisans from disadvantaged communities in Haiti, Africa and Central Asia" (Ethical Fashion Initiative – Ethics). The EFI reports that their work directly contributes to SDGs 1, 4, 8, and 12.

By working directly with the artisans, the initiative aims to reduce the spillovers that can occur when European brands are unaware or choose to ignore the unsafe and exploitative factories they produce their clothing in. They have also developed a code of conduct that allows informal sectors not in direct cooperation with the initiative to achieve the status as "EFI Compliant" (Ethical Fashion Initiative – Ethics). Similar sorts of initiatives with codes of conduct have been created but whether they are correctly implemented remains a question. The Ethical Trading Initiative, an independent organization, aims to implement a base code of conduct among the supply chain in order to create a space for workers to "bargain with management through trade unions" (Ethical Trading Initiative – About). In an ideal world, this could work, but oftentimes the women working in these factories are hardly in the position to bargain nor argue over their wages or working hours. Many women come from villages to work and the jobs are in high demand. Those who do not comply with the rules will easily be replaced.

And when it comes to a company's code of conduct, how well are they followed? According to Zara's Code of Conduct, working hours should not be excessive, but the working hours reported by PublicEye found that one factory had two shifts to cover round the clock working (Kollbrunner 2019). Does this reflect a purposeful gap in Zara's own Code of Conduct due to unclear terminology or a violation of the code by the supplier? These are perhaps the most challenging questions to answer when deciding who exactly is responsible for what. There needs to be change and improvement on all levels of the supply chain. From the top of the chain where clothes are designed and marketed, to the factories producing the clothing. Brands need to be made aware if their quotas overwhelm the factories and similarly, factory managers need to be held accountable for upholding codes of conduct that limit excessive working hours or unsafe working conditions. Without proper transparency and communication on all levels of production, exploitation will continue to take place.

Supply Chains

Social sustainability

The worst disaster to date that the fashion industry has faced happened in Bangladesh in April 2013. The Rana Plaza garment factory collapsed due to poor building safety standards, which resulted in the death of over 1100 factory workers, who were producing garments for global fashion brands. (Rafi-Ul-Shan, Grant & Perry 2016). The fashion industry had already faced a lot of criticism before, but after these shocking events, there has been an increased focus in safety and sustainability issues in the fashion industry. However, there is no universally accepted definition of sustainability and the interests of different stakeholders make these issues complex.

The social issues often associated with fast fashion are workers' rights and working conditions. These include for example inequality, poverty, access to health care and education, forced labour, working hours and work safety. A common problem in many developing countries is also child labour, which is mostly caused by other social issues mentioned previously. Also, many other problems are linked to each other, which is why they pile up in the same areas and with the same people. Fashion companies are taking advantage of lower labour costs by outsourcing production to developing countries, which often means also taking advantage of the local people. Health and safety standards are usually lower than in developed countries and monitoring practices less strict. (Rafi-Ul-Shan et al. 2016).

Fashion companies have tried to introduce solutions for these problems. Ethical codes of conduct, sustainability reports and programmes can be found on many companies' websites. As an example, Inditex's Annual Report (2016) mentions four SDG's and explains how the company contributes to achieving them. The mentioned SDG's are Goal 3: Good health and well-being, Goal 5: Gender equality, Goal 8: Decent work and economic growth, and Goal 17: Partnership for the goals. The company's contribution is mostly based on different programmes, policies, and co-operations. It is clear that Inditex has put an effort into improving workers' conditions and takes these issues seriously. However, the report had truly little information about how the programmes and policies work in practice and how Inditex ensures that these are followed throughout the supply chain. Similar statements can be found in H&M Group's Sustainability Performance Report (2019). They highlight for instance identifying risks, collaborating with partners, and committing to respect human rights. The same questions arise as with Inditex when reading this report. Everything seems to be well planned, but again, the lack of concrete actions and results is distracting.

A worrying example of poor monitoring can be seen in a documentary series *Verta, hikeä ja t-paitoja* (2020) produced by YLE, Finland's national broadcasting company. In the seventh episode of the series the protagonists visit a garment factory in Myanmar, where the workers produce clothes for international brands. The factory does have a set of rules on its wall, made by the Ethical Trading Initiative. The rules include nine promises about workers' rights and working conditions in the factory. Already in this short episode they find out that at least two rules, one about working hours and one about wages, are not followed. The workers do not complain, because they do not want to risk losing their jobs. This is just one example, but it raises a lot of questions. If the rules are broken in this factory, how many other manufacturers break the rules and how severely? Does the European company on the other end of the supply chain have any idea about what is happening?

It seems like nowadays many companies and consumers are aware of the social issues related to the

fashion industry. Also, it seems like people want to make good choices as consumers and companies want to make sure their supply chain is thoroughly sustainable. The problem lies in the lack of knowledge and information. If the companies do not have proper tools to make sure their codes of conduct are followed, it is difficult to track where the problems of the supply chain are. This is confusing for the consumer. It is difficult to make sustainable choices, if it is not clear, which choices are sustainable.

Environmental sustainability

The supply chain in the textile industry can be geographically long and complex. It starts from agriculture (for natural fibres) and petrochemical production (for synthet-ics) and continues to manufacture, logistics and retail. The first steps take place mostly in the Global South. Some of the most significant material producers and garment manufacturers these days are China, India, Bangladesh, and Southeast Asian countries. Retailers and consumers on the other hand are mostly located in Europe and the USA. Textile waste is found globally. (Niinimäki et al. 2020). Each step has an environmental impact, because of water, energy, material, and chemical use. However, the consequences are distributed unevenly. The Global South, where the textile and clothing are largely produced, bear the burden for the Global North, where the products are consumed (see figure 1).

Textile production uses large amounts of water. Cotton has the highest water footprint of any fashion fibre, and its cultivation and the wet processes of textile manufacturing, such as bleaching and dyeing, require trillions of litres of water annually. Globally, 44% of cotton is grown for export, so foreign demand causes about half of the local water use impacts of cotton cultivation. (Niinimäki et al. 2020). This causes problems especially in arid regions, where groundwater and drinking water losses complicate the daily lives of local people. Also waste water from the fashion industry impacts local water supplies. If the wastewater is not treated properly, there is a risk that toxic chemicals are released in nature, which causes harm for the people and the ecosystem. The fashion industry causes 10% of annual global carbon emissions (World Bank 2019). This comes from high energy use and the sources of the energy used. For example, textile manufacturing in China relies mostly on coal-based energy. The phase where energy use and CO2 emissions are highest is in fibre extraction, es-pecially with synthetic materials. Additionally, the production method has an impact on the environmental consequences. Even though natural fibres have a lower carbon footprint in comparison to synthetic ones, processes like cotton cultivation require lots of chemicals, such as pesticides. (Niinimäki et al. 2020).

All these first steps in the life cycle of a garment usually take place in the developing world. In addition, the environmental regulations in these countries are often not very strict. Even though the impacts of transportation and increasing

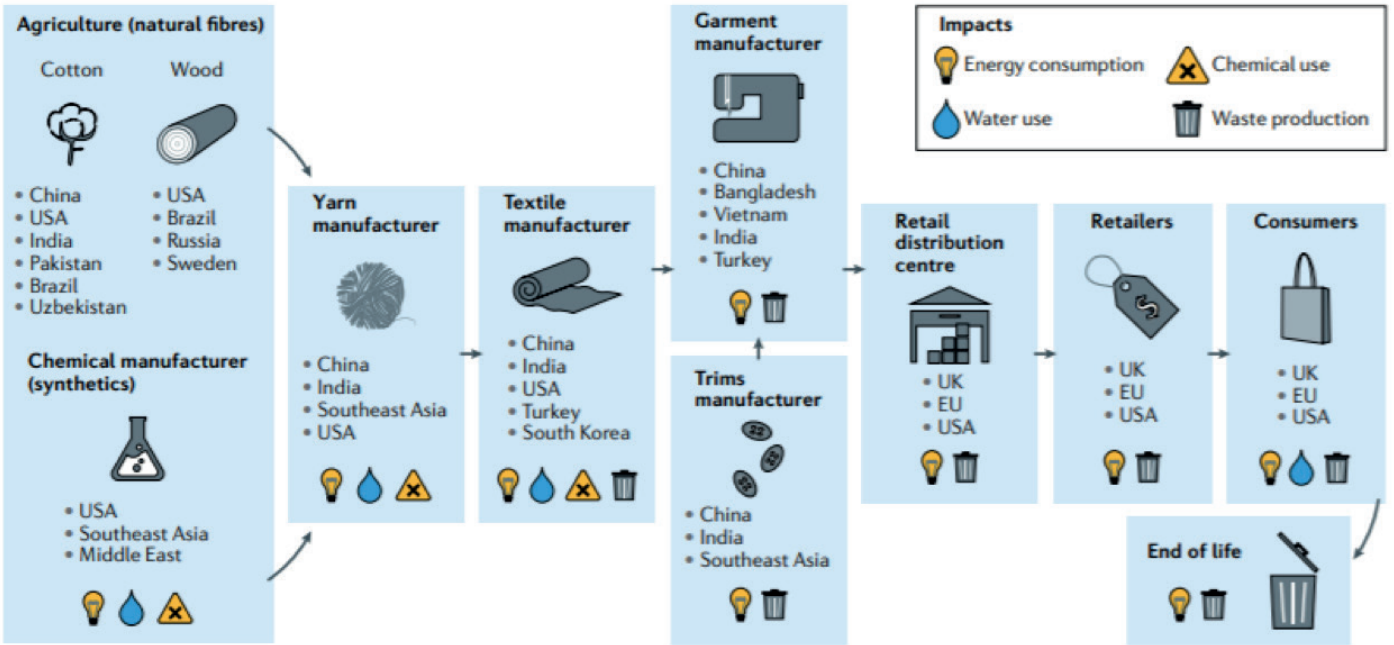

Figure 1. Garment-manufacturing supply chain. The key steps of garment production, geo-graphical locations, and environmental impacts. (Niinimäki et al., 2020).

textile waste can also be seen in the developed countries, it is still undeniable that the worst hazards and effects of pollution have been shoved to the developing world. The impacts of the fashion industry speed up climate change, which has an influence on the whole world. However, the worst risks are not spread out equally, since many developing countries are located in the areas that are most vulnerable for natural disasters and extreme weather events, and climate change increases the risk of these hazards.

As with the social impacts, European fashion companies have tried to tackle the environmental impacts with different programmes and initiatives, but it looks like some-thing much bigger has to be done. The whole industry should reinvent itself, as the World Bank (2019) and many NGOs have suggested. The era of fast fashion should come to an end and the transition to a more sustainable model should begin. This requires changes from both companies and consumers. As consumers, changing our habits to buying less, prioritizing quality, and wearing clothes longer would already make an impact. For fast fashion companies the changes are much bigger and might require a lot of time. Changing the whole business model from fast production and low prices to environmental sustainability and quality materials does not happen overnight. Technology and research could be part of the solution and help to create more sustainable ways for the fashion industry to operate.

Second-hand clothes: Curse or blessing?

The story of our clothes often doesn't stop in a cupboard. They travel further, either participating in the global waste flows as part of the over 750,000 tons of textiles thrown away every year (see following article) or they are recycled and then sold to the Global South, where they are worn in everyday life. In general, the second-hand clothes (SHC) trade takes only a small proportion of the total global traffic of fashion (less than 0,5 percent), but especially for the Sub-Saharan African countries it's one of the most dominant economics concerning clothes (see figure 2) (Fairwertung 2019; Baden & Barber 2005).

What consumers of the Global North are often not aware of is the fact that clothes given to charity organisations aren't always directly delivered as free goods to those who need them, operating more as a business instead (see figure 3). One of the reasons for this is that clothes recycled in the Northern Hemisphere are not always fit-ting the climatic and cultural circumstances in the receiver countries and thus need to be sorted out. Clothes that cannot be sold by the local charity shops in the Global North are then often traded to commercial textile recyclers. The commercial recyclers sell the clothing abroad which is quite profitable and has a wide variety of impacts. The relationship between the charity organizations and commercial companies, the financial issues, and the aspect of turning a donation into a trade is not really

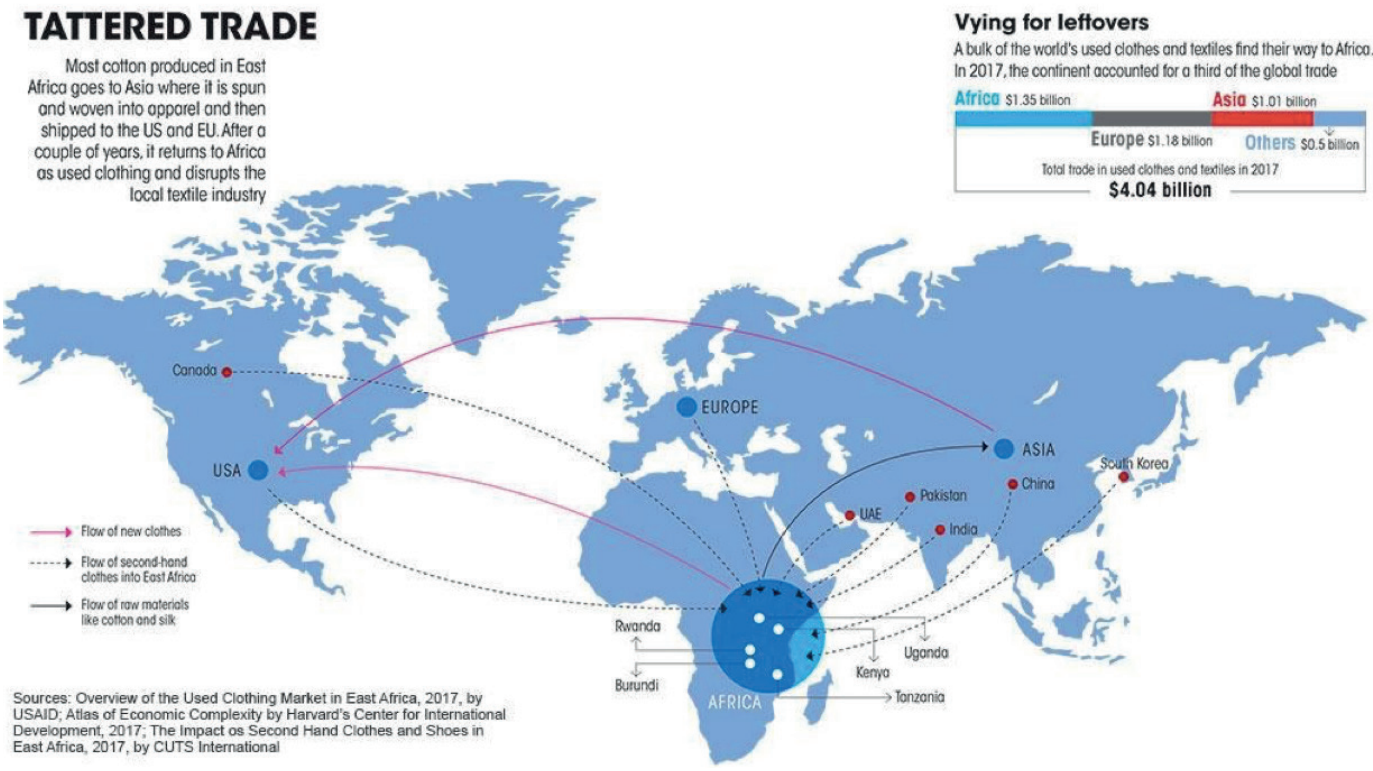

Figure 2: Global fashion flows (Botma 2019).

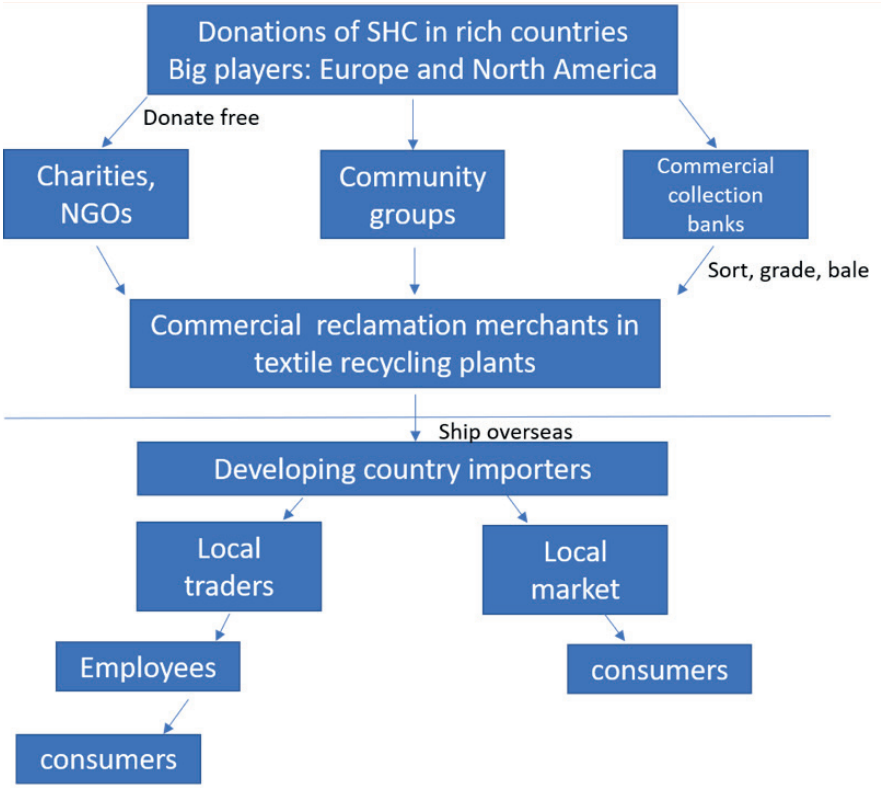

Figure 3: Recycling chains (based on Baden & Barber 2005).

published and consumers are not always aware of this connection (Norris 2012). Recycling is therefore a quite easy way to make money and the former intentions of consumers – sustainability and especially helping others in need with their free donation - turn out to be secondary. There has only been little research on this wide unregulated and internationally working market (Norris 2012), but the Figure 1 below shows a rough structure of what it might look like.

The import of SHC into the countries of the Global South and their influence on the local economies are subject to a wide range of discussion. There are two different main opinions on the impact that SHC have on the importing countries. Some researchers say that large imports of recycled clothes cause huge damages on the na-tional economy and the local fashion industry (Norris 2012). This led for example in the 1990s to a decline in the Kenyan textile industry. However other researchers argue that this relationship isn't necessarily causal as the "traditional" clothes aren't worn daily anymore.

The assumption of the repudiators that fewer imports of second-hand clothes would lead to an increase in the local fashion industry are widely criticised and might not be correct as the struggles of local fashion industry are not only caused by second-hand imports but also by a lack of capital or other unfortunate conditions like no electricity or the lack of a continuous supply chain. Moreover, the rather small fashion industries in the Global South might not be able to fulfil the demand of clothes needed. A ban on imports of new SHC would not necessarily lead to the recovery of the local fashion industry as the trade of cheaper fashion from Asia is increasing. In the rural regions of Africa people can mainly choose between second-hand or new Chinese clothes, which can be unaffordable or made from synthetics not favouring the mostly hot and humid climates, so that the people are dependent on the SHC (Baden & Bar-ber 2005; Fairwertung 2019; Norris 2012).

In most of the receiver countries the majority of the traders, also of locally produced clothes, seem to have a more or less neutral view on the competition with the SHC trade, as they don't offer the same (quality) of goods. Therefore, the negative impacts of SHC trade on the own fashion industry is perceived as rather low. Of course, this is not the case in all the importing countries (Baden & Barber 2005). Some countries like Rwanda or Kenya tried to ban the SHC imports arguing that their economy was suffering under the huge negative impacts of the dominant SHC trade. Big exporters like the US claimed that these bans were violating international trade agreements and researchers argued that they would additionally lead to the growth of the illegal SHC trades. This intense reaction might also be based on the fact that the countries of the Global North benefit greatly from

the SHC trade as they eliminate big textile waste in their own countries, which causes huge problems in their landfills. These landfills are costly to operate, mostly with tax dollars and are quickly filled. Therefore, countries of the Global North are rather exporting their "waste" clothes to developing countries, which has kind of a dumping effect on them (Opati, 2019).

Even without a ban the SHC trade has already a quite strong informal sector which unlike the formal one is not accompanied by social or legal protection for employees and in some cases, facilitates considerable custom frauds by passing of new clothing as SHC. These illegal imports of goods and corruption in general have a huge impact on the national economies and the SHC trade itself. To stop these practices researchers recommend controlling all the parts of the trade and standardizing all the steps (Baden & Barber 2005, Fairwertung 2019).

However, the importing countries can also benefit from the SHC trades for example, through the creation of a wide range of jobs and earning good money as market traders, or through washing, mending, and ironing the clothes. Furthermore, the second-hand trade offers the possibility for people with rather low income to follow the fashion trends of Europe and the US, which is, especially for the younger generation, quite important. As in Europe and North America, fast fashion is getting more and more common and the quality of the clothes mainly coming from Asia isn't as good anymore this might lead to a "natural" decline of SHC exports and a growth of waste in the future (Norris 2012; Baden & Barber 2005).

Researchers suggest that the impact on the local fashion industry can be reduced through a shift towards a production for the export market and a specialisation on a particular type of textile. By investing into new equipment to improve the production processes the entrance into the global fashion industry would be easier and locals could compete on the global market. This would require big investments that might not exist in developing countries (Opati 2019).

The opinions on SHC trade are truly diverse. Due to a lack of data and studies of the real extent, impact and spillover effects of SHC trade are not yet analysed properly, but it is obvious that regulations are needed, especially to avoid the dumping effect of economically strong countries to the Global South. But what kind of regulations could work and how is it possible to include all the different opinions into this process? How can it be avoided that the economically strong Global North overrules the receiver countries in order to keep their advantages of textile waste dumping?

Case Study H&M: Sustainability pioneer or "greenwashing"?

Fashion brands such as Adidas or C&A are often blamed for their rather unsustainable supply chain and their little effort to make changes, while others like H&M are planning to make changes in their supply chains through the inclusion of different standards in their agenda (Shen 2014). In this short case study we try to figure out if the international working company of H&M is really making changes in their production of clothes towards sustainability or if their whole campaign is in some way just a kind of so called "greenwashing".

H&M is a Swedish fashion company with more than 3000 stores across the whole world, with a higher concentration in Europe. As a reaction to the collapse of a fashion factory (Rana Plaza) in Bangladesh, which was also working for H&M, the company launched their sustainability program and their incorporation in the Bangladesh Accord Foundation. The accord can be seen as an agreement between brands and trade unions to work towards a safer and healthier working environment in the garment industry of Bangladesh through the monitoring of factories and trainings for suppliers and their workers (Baydar 2018, Shen 2014). H&Ms own sustainability program works, aligned to the UN's SDGs, additionally towards more job opportunities in less developed countries, as well as the education of their consumers towards sustainable behaviour (Shen 2014, Illes 2020).

For its environmentally sustainability H&M tries to use mainly organic cotton and is investing in its sustainable production. Controls are performed by the Better Cotton Initiative, which is helping farmers to establish better farming techniques. Furthermore H&M cooperates with the WWF to improve their water management in all the steps of their fashion production following the SDG goal of clean water. Aligned to the SDG Goal 12, responsible consumption and production, the company tries to use recycled materials like polyester, plastic, or wool to save energy and water, lowering their emission and reducing their waste. Additionally, they established an old

garment collection program for their customers using different categories like re-wear as SHC, reuse and conversion into other products or recycle to turn them into textile fibres (Illes 2020; Shen 2014).

Another aspect of H&Ms sustainability program as well as part of the officially signed accord is the payment of fair living wages to all the workers above the minimum wages of their countries. To improve the workers' situation even further H&M promised to establish a complaint hotline for them, where they can report any critics directly to the company, as well as a workers' representation to manage a better communication between the manager and the employees (Baydar 2018, CCC et al. 2015). Altogether, H&M has agreed to make huge improvements in their supply chain and is publishing its progresses on the company website visualizing them through maps and studies. After visiting some of the garment factories producing for H&M some humanitarian organisations blamed H&M for their greenwashing, as they couldn't see any developments towards better working conditions. Even if H&M is positioning themselves towards a more sustainable behaviour, their production is still based on suppliers in cheaper labour countries with a rather low-level of worker protection instead of moving it to countries with stricter rules. The promise for fair living wages paid to the workers is far from being fulfilled, sometimes the wages even lie below the legal minimum wage (Shen 2014, Baydar 2018).

Even if the complaint hotline and the workers' representations seem to be a good idea, a study stated the fears of workers being fired in case they would form a worker's representation. One of the major criticisms of humanitarian organisations is that garment factories which are not following the restrictions and rules of H&M aren't getting any sanctions. An analysis by the Clean Clothes Campaign (CCC) and other charity organisations showed that even the Platinum and Gold suppliers – factories H&M labels as their best performers of their sustainability goals in their supply chain – are dramatically behind schedule. Through poor safety conditions they are putting their workers lives at risk and the wages are not even close to being fair. CCC claims that H&M is making empty promises and is presenting great achievements with their campaign even though there are no real improvements being made (Baydar 2018, CCC et al. 2015).

The question if H&M is "greenwashing" cannot be answered completely. H&M is presenting itself as a pioneer of sustainability in the fashion industry even though they are still behind their own schedule. There are still big problems to overcome and the studies and maps on their websites are not always showing the truth, but at least some successes can be recorded, and every step can in some way be seen as an improvement.

Outlook on European Garment Industries

There is an assumption carried by many consumers that clothing produced within Europe for European fashion brands are focused on fair and equal treatment of their workers. Assumptions are held in reference to the idea that 'Europe is developed, so it must be good.' This, however, is far from the truth. One of Clean Clothes Campaign's current campaigns focuses on the lack of living wages in European garment factories. "There is a large gap between the legal minimum wages in Eastern/South-Eastern Europe and Turkey, and what a worker would actually need to provide for themselves and their family" (Clean Clothes Campaign - Living Wages in Europe).

Clothing brands can often receive undeserved respect for manufacturing their clothes in Europe due to the assumptions made from the label. Simply put, "Made in Europe" does not guarantee that clothes are made fair, with workers facing extremely low wages and many other labour rights violations" (CCC - Living Wages in Europe). Inditex - the parent company of brands like Zara, Pull & Bear, and Bershka, is one of the most successful fast fashion industries in the world, with a total of 1,597,260,495 clothing items sold in 2018 alone (Kollbrunner 2019). In order to do so, new clothes and trends are cranked out on a nearly biweekly basis. To keep with this pace, manufacturing centres are kept close by for cuts in transportation time - namely in Turkey. Conditions in these factories often mirror the ones found in Asia - excessive working hours, low pay, and predominantly women. However, fast-fashion brands are not the only ones contributing to the problem. Many high-end leather brands outsource their labour to countries like Bulgaria, Turkey, and Romania (CCC - Living Wages in Europe).

The women working in these factories are often the "breadwinners" for their family but earning wages barely enough to support one person, let alone an entire family. "In Romania for example, with almost half a million people the biggest garment workforce in Europe, the average wage within regular working hours of interviewed workers is as low as

14 percent of a living wage" (CCC - Living Wages in Europe). As we work towards improving the global spillovers of the European fashion industry it is imperative that we acknowledge the impact being felt by everyone, even when they are close to home.

Conclusions

The spillover impact of the fashion industry is widespread in almost all sectors of SDGs. Environmental degradation begins when cotton is picked and plastic textiles like polyester and acrylic are produced. A female-majority workforce is paid inade-quately along all steps of the supply chain. Workers continue to live in poverty while producing for billion-dollar industries. Textile waste continues to build as clothes are produced at tremendous speeds and clothes are improperly recycled or dumped in Sub-Saharan and West Africa putting pressure on the rather weak local fashion industry.

Fashion brands have a social, ethical, and environmental responsibility to lessen their global impact. Doing so is not simple but many organizations and initiatives are already in place that provide a framework for improving production. A transformative change is required from these industries; to not only revolutionize their concepts of a supply chain, but to revolutionize the way the public thinks about clothing. As long as the same concepts for fast fashion exist, the problems outlined in this report cannot truly be erased. An industry that revolves around affordable clothing that is continuously switched out to new trends and styles, is not a sustainable operation. Textile waste will continue to grow, and laborers will continue to be exploited.

Can the fashion industry evolve into a sustainable garment industry? Where clothing is marketed and sold based on durability and ethicality as an investment and not as "this season's trend"? In order to do so brands can start by slowing production and focus on creating items that utilize fabric sustainably and serve as staples for their brand. Items that are always available and not ditched after a few months on the shelf. For brands like Zara or H&M a change like this would be revolutionary, but it is what is necessary for sustainable development. SDGs cannot be attained in a world that cannot transform their habits and values to those that reflect sustainability.

Sewing machine at home in Luang Prabang, Laos. Photo: Julia Viertola.

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Global plastic waste flows

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Photo: Julia Viertola

Introduction

Enacted in 2018, China's "National Sword" ban on plastic created a ripple effect across the world, especially for Southeast Asian countries. Researchers estimate that China's new plastic ban will displace 111 million metric tons of plastic waste by 2030 (Brooks, Wang, & Jambeck, 2018). Since 1992, China imported 45% of all plastic waste. China's previous restriction on plastic imports "Green Fence" dropped plastic values by $446 million (export) and $298 million (import) when it was implemented in 2013. Although China will still allow some high quality, low contamination, industrial plastic waste, consumer goods with the plastic types of PE, PS, PVC, PET, and other (e.g. PP) will no longer be allowed. The ban includes bales of PET bottles, CDs and video disks, as well as aluminum plastic film. Given the global dependence on China's recycling infrastructure, where will the waste go?

There are three main aims of this report about global plastic waste flows. Firstly, to examine the availability of data on global plastic waste trade flows, secondly, to analyze the impact of China's import ban in 2018 on the flows of plastic waste and thirdly, to interpret how the plastic waste trade and China's ban interface with the Sustainable Development Goals (SDGs). The United Nations Commodity Trade (UN Comtrade) Statistics Database is used in the report to evaluate fluctuations in waste exports and imports. The report's geographic focus is Southeast Asia, where most plastic waste flows have been redirected following China's 2018 ban.

Aim of report

Globally plastics are one of the most widely used materials (C. Wang, Zhao, Lim, Chen, & Sutherland, 2020). Global production of plastics, which is increasing at a fast rate, is currently over 300 million tons per year (W. Wang et al., 2019). Consequently, millions of tons of plastic waste are produced each year. As a result, the global trade of plastic waste has grown dramatically in recent decades. Global North export plastic waste to save money on waste disposal and Global South decrease the manufacturing cost of plastic products because recycled plastic is cheaper than raw materials (C. Wang et al., 2020). However, less than 10% of all plastic waste is recycled to the original materials, causing serious environmental and social problems (W. Wang et al., 2019). On a global scale, issues caused by plastic waste disposal are unevenly distributed, causing inequality and environmental injustice.

During the last three decades, Asia has been the dominant importer of global plastic waste due to the inexpensive labor, lax environmental regulations and low healthcare costs. Between 1991 and 2017 China was the main importer of plastic waste (C. Wang et al., 2020), importing 45% of all plastic waste since 1992 (Brooks, Wang, & Jambeck, 2018). China's economy has grown, decreasing its dependence on the plastic waste trade. Since 2010 China has gradually implemented stricter waste import policies, with new regulations being released annually between 2011 and 2013. While these regulations included temporary bans and restrictions, a permanent ban of nonindustrial plastic waste was announced in 2017 and adopted in the beginning of January 2018 (Brooks et al., 2018; C. Wang et al., 2020). According to Brooks et al. (2018), it is estimated that China's ban will result in a displacement of 111 million metric tons of plastic waste by 2030. This amount is equal to almost half of all the global plastic waste imports since 1988. Since China's ban in 2018, plastic waste trade flows have been redirected to Southeast Asian countries. For example, Thailand's imports increased by 640% from January to June 2018, and Malaysia's increased by 273% (C. Wang et al., 2020). The plastic waste trade causes huge environmental and social impacts on the countries that are importing the waste. China's ban has had large spillover effects, transferring social and environmental problems to other countries. The effects of China's ban, as well as the plastic waste trade in general, can be analyzed in relation to the SDGs, allowing synergies and tradeoffs between these to be identified.

Global plastic waste is a phenomenon with pervasive impacts on a wide range of different issues—what makes the topic relevant from geographical point of view? As a science, geography focuses on the interaction between humans and the environment. Geographers analyze the questions regarding cause and effect and are well equipped to pay attention to not only space, but also to humans, who use their surrounding space for economic purposes (e.g. Kahraman 2016, p. 121). Global plastic waste flows intertwine with several of those themes. As a relatively cheap yet long-lasting material, plastic quickly became a widely utilized material for manufacturing, packaging and shipping. Between 1964 and 2015 the production of plastics increased more than twenty-fold. Plastic can

be regarded as a significant industrial innovation and it has contributed substantially to economic growth. (Science and Technical Advisory Panel 2018, pp. 3-5.) The apparent benefits of plastic have led to its widespread nature, but the development has also raised problems, especially environmental ones. Manufacturing plastic requires fossil fuels, such as natural gas and oil. Furthermore, plastics remain in the ecosystem for a long period of time; it can take up to 500 years for plastic to break down, causing a cascade of environment consequences. (ibid.)

Plastic waste is therefore profoundly connected to the economic well-being, but also to the relationship between human and nature - in other words, plastic is connected to some of the central questions addressed by geography. In tackling the problems caused by plastic waste it is also essential to recognize some of the spatial patterns involved in the phenomenon. The increase in both plastic's economic significance and its sheer amount has led plastic waste to become a commodity that is sold, bought and shipped around the globe. By aggregating and visualizing information, it becomes possible to locate the epicenters of a societal and environmental challenge like plastic waste. In our case study, there can be seen a clear spatial pattern, a flow of plastic waste from Global North to Global South, specifically to Southeast Asia.

The global waste trade also raises several questions regarding the unequal relationship between rich and poor countries. Many geographical research traditions, such as critical geopolitics and political ecology, can provide valuable insights in analyzing the underlying power relationship between different areas of the earth and their position in the global waste trade. Political ecology analyzes human-environment interaction, observing environmental issues through the lens of political-economic context and power relations that have produced the phenomena (McCarthy 2017, p. 2). In the case of plastic waste flows, the world has been divided into wealthy producers and benefiters of plastic manufacturing, and to the poorer areas, who buy plastic waste and inherit the environmental problems associated with plastic. Historically, most of the plastic has been produced in Europe and the United States, although during the recent years, the focus of plastic production has shifted to Asia (Science and Technical Advisory Panel 2018, p. 5).

Busy street in Bangkok. Photo: Julia Viertola

Despite the shift, the European Union and the United States remain among the leading exporters of plastic waste to Southeast Asian countries. Their position as leading exporters can create problems which further complicate the handling of plastic waste and the environmental problems it causes. For example, non-governmental organizations, such as Greenpeace, have produced reports that illustrate the ramifications caused by plastic waste exporting. Rich countries in Global North would be far better able to invest into the latest recycling and waste recovery facilities, than poorer countries in Global South, that are not fully prepared to deal even with their domestic waste. Pinpointing the biggest importers of plastic waste could also enhance consideration about whether the international trade system works sufficiently for different participants, or if the current international legislative framework provides enough protection to poor countries. (e.g. Greenpeace 2020, pp. 2-3.)

Geographical analysis concerning the hot spots of global waste trade can also shed light on wider problems of inequality across the world. By locating some of the most significant importers of plastic waste in the world it becomes possible to scrutinize, what function does waste trade serve for those countries, and what are the economic possibilities in those areas. Besides the waste import committed by the governments, waste trade provides income also for many citizens in those countries. By following the global flows of plastic waste draws attention on the labor markets in different parts of the world, and to the importance of waste picking as a way of making a living in a labor market characterized by informal work, precarious livelihoods, and loss of formal jobs (Millington & Lawhon 2018, p. 1048).

Materials

The United Nations Commodity Trade Statistics Database (UN Comtrade, 2020) served as our primary data source for international plastic trade. The UN Comtrade Database is a depository of international trade data. From this database, we queried for the plastic trade data with the code 3915, which represents waste, parings and scrap of plastic. Under this code, data is available from year 1996 to 2018 and from 196 countries. The data is available both as trade values, converted into US dollars (USD), and as net weight (kg). It is obtained from statistical authorities from reporter countries or areas who provide the United Nations Statistics Division (UNSD) with the countries' annual international trade statistics data categorized by commodities or services and their partner countries.

Visualizations were created using the UN Comtrade data on 3915 (waste, parings and scrap of plastic). To create the maps, import and export data was collected for China and 10 Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. In order to capture changes in global waste flows after China's "National Sword" ban, trade data from 2017 and 2018 was used. Import and export values, measured in both USD and kilograms, were added to a table. The difference in trade from 2017 to 2018 was calculated and added to the table. The percent change from 2017 to 2018 was also calculated and added to the table. Maps were created by joining the UN Comtrade data and subsequent calculations to the basemap Admin 0-Countries, 1:10m cultural vector, version 4.1.0. provided by the website Natural Earth Data. Visualizations were created using QGIS 3.10 'A Coruña'! For each visualization, a diverging colormap reflects an increase or decrease in imports or exports from 2017 to 2018.

Discussion

Our group searched for information about plastic waste trade data collection, the causes of China's domestic plastic import ban and the interlinkages of plastic waste flows and SDGs. In several articles concerning plastic waste flows, the UN Comtrade database was mentioned and used. We found that the UN Comtrade database is quite easy to find, but cumbersome to use and of questionable validity. The statistics 3915 of waste, parings and scrap of plastic is easily accessible with just a few clicks. The data is sorted by trade value, and one cannot change the interface to sort by kilograms. Sorting by weight would be a valuable feature and better suited to a sustainable development approach, as the monetary value of plastic associated with weight may fluctuate. The trade value likely determines the sorting order because of the UN Comtrade's focus on international trade, and not environmental or sustainable policy. This emphasis on trade is probably why there is no information on the website on exactly how the data is collected, except for that it is reported voluntarily by countries. This is suspected to cause the real trade numbers being bigger than reported, due to exporting countries' possible attempt to look more humane

and importing countries' possible attempt to hide the information about their government's short-sighted solutions from their citizens (C. Wang et al., 2020).

Even though there are these statistics available on plastic waste trade, data accountability is a problem. When the UN Comtrade did not offer more than these voluntarily reported statistics with emphasis on trade and not on data collection, our group looked for information about the actual data collection elsewhere. We had a difficult time trying to find English documentation about the plastic waste trade data collection processes in our research area, Southeast Asia. Although our group attempted to search for official information, the only results that we found were news articles, not official sites or academic articles in English.

While data availability in English may be poor in Southeast Asian countries, questions about data accountability occur also elsewhere. For example, even in a country with high-quality statistic production such as Finland, we found contradictory information about Finland's exports within the EU. The website of Ministry of the Environment claims there is no information about Finland's export in the EU; however, in the UN Comtrade statistics we found trade value and weight of Finland's exports also within the EU. This raises questions of how this data has been collected and by whom, or why the officials say they do not have the information.

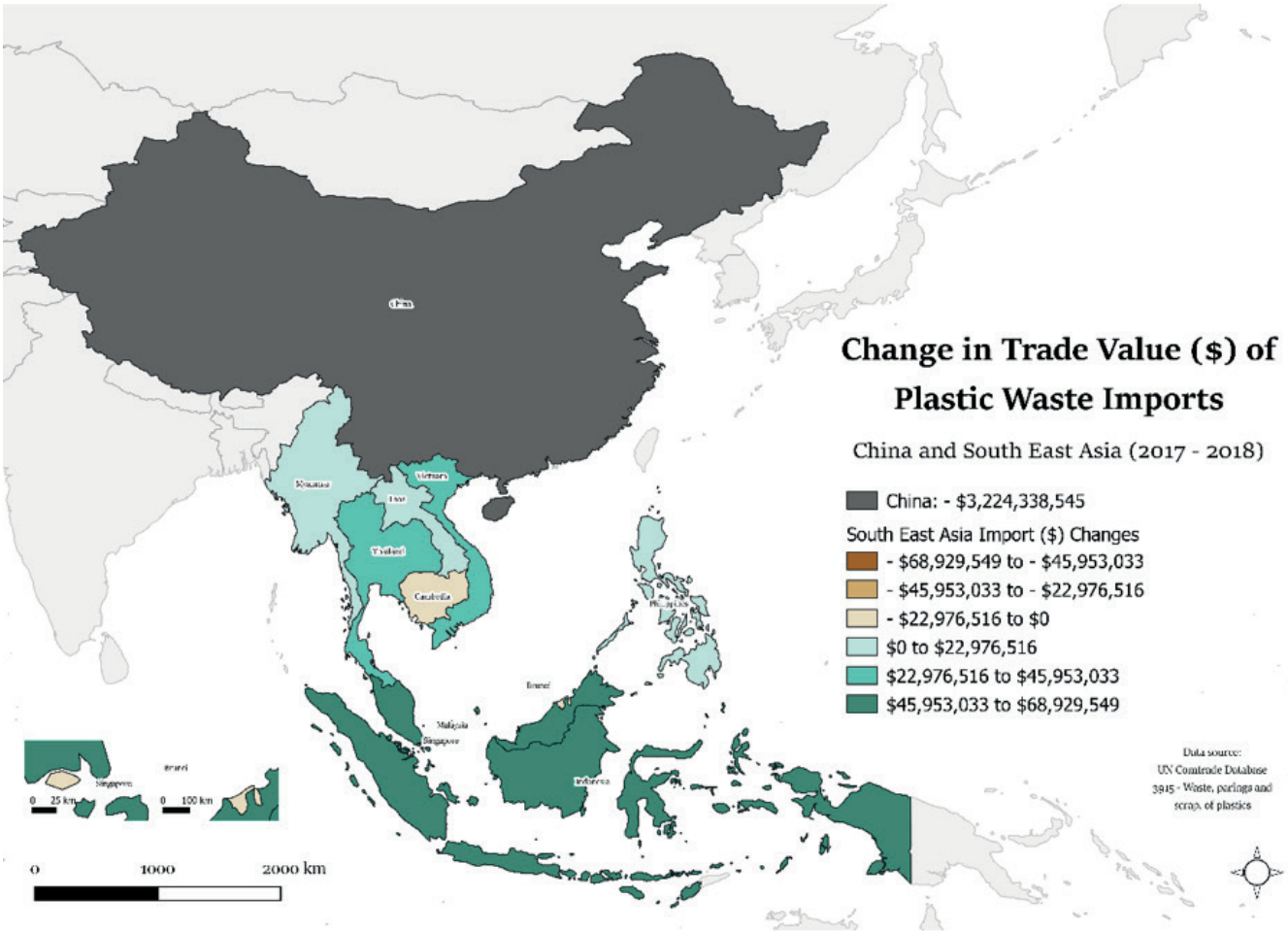
The lack of information on data collection methods also raises the question if the collected data is universally comparable, since different countries may have different data collection methods and classification methods when it comes to waste management. It is also possible that different actors are not even trying to collect real data due to illegal trade and circumvention of environmental laws (Wang et al. 2020). Gregson and Crang (2015) also criticize the UN Comtrade's classifications as misleading, due to problematic categorizations of used and discarded goods, because the boundaries of useless waste and useful goods and materials are changeable. These classifications are political choices, not neutral, objective facts.

China

According to UN Comtrade Data, China drastically reduced the import of plastic waste and slightly reduced the export of plastic waste from 2017 to 2018. In 2017, China imported 5,828,749,884 kg of plastic waste from across the globe. Following the ban, China's plastic waste imports dropped by 99% to 51,604,609 kg in 2018. Notably, because China only banned the import of consumer plastic waste, the imports did not fall to 0 kg. Under the ban, the import of certain industrial plastic waste is still allowed. Industrial plastic waste, as compared to consumer plastic waste, tends to be less contaminated and therefore more suitable for recycling (Brooks, Wang, & Jambeck, 2018). From 2017 to 2018, the trade value in USD of China's plastic waste imports also decreased by 99%. In 2017, China imported $3,263,374,809 of plastic waste and the trade value decreased to $39,036,264 in 2018. China reported the export of 29,646,561 kg of plastic waste in 2017 and 0 kg of waste in 2018. In trade value, China exported $70,845,724 of plastic waste in 2017, which decreased by 5% to $67,154 999 in 2018. Based on the trade value, China's reporting of 0 kg of exports is potentially inaccurate.

Southeast Asia

Given the previous magnitude of China's plastic waste imports, there were ripple effects elsewhere when the import ban was put into place. Statistics alone cannot fully depict how the ban impacted neighboring countries in Southeast Asia; however, UN Comtrade data demonstrates significant increases in plastic waste imports in numerous Southeast Asian countries. Based on import value and kilogram weight, Malaysia, Indonesia, Thailand, and Vietnam saw the biggest increases in plastic waste imports (Figure 1). The same four countries also experienced the largest decrease of plastic waste exports (Figure 2). From 2017 to 2018, Malaysia, Indonesia, Thailand, and Vietnam experienced increases of 400 million, 322 million, 192 million, and 41 million kilograms of plastic waste, respectively. The Philippines, Laos, and Myanmar had more modest import gains. Based on percent increase from 2017 to 2018, Thailand, Myanmar, Indonesia, and Laos experienced the most significant increases in plastic waste imports. Imports of plastic waste increased by 262%, 149%, 102% and 78% respectively (Figure 3). Based on percentages, all countries experienced a decrease in plastic waste exports by weight. Only the Philippines experienced a slight (13%) increase in the export of plastic waste by USD value. China and all other countries in Southeast Asia experienced a decrease in the trade value of their plastic waste exports (Figure 4).



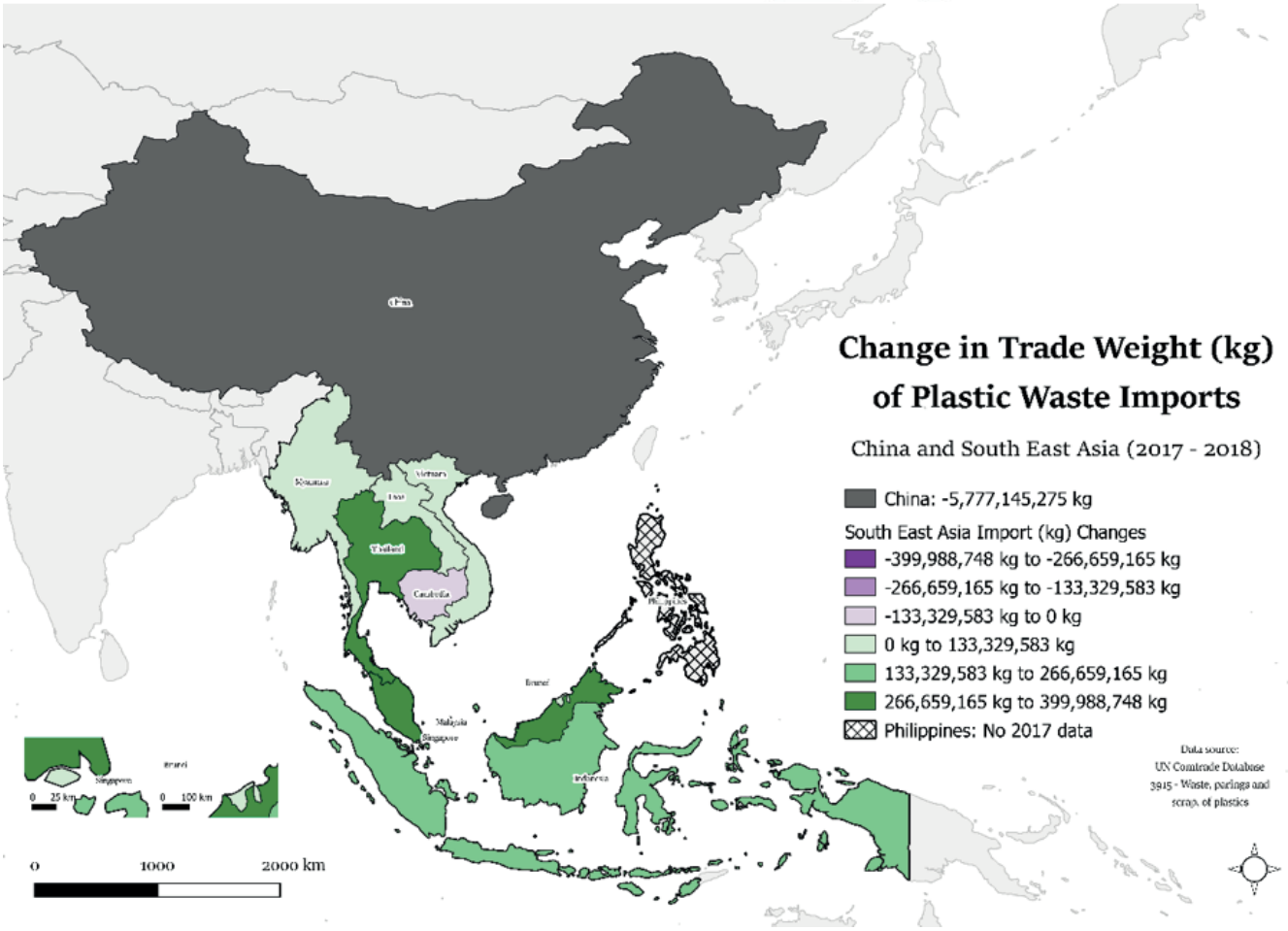
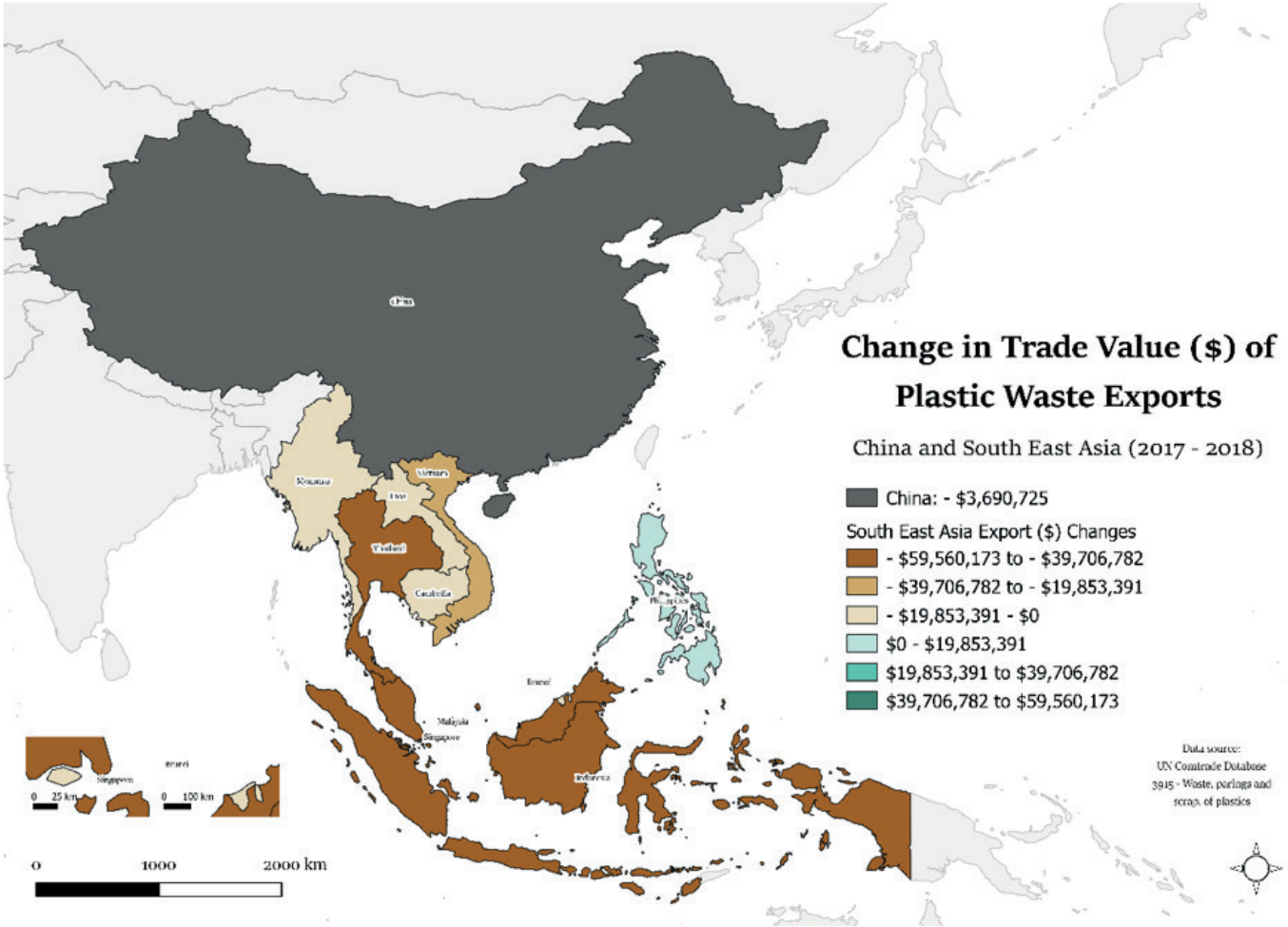


Figure 1. Plastic waste import changes from 2017-2018. A comparison of the trade values (USD) and trade weights (kg) of plastic waste imports by Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.



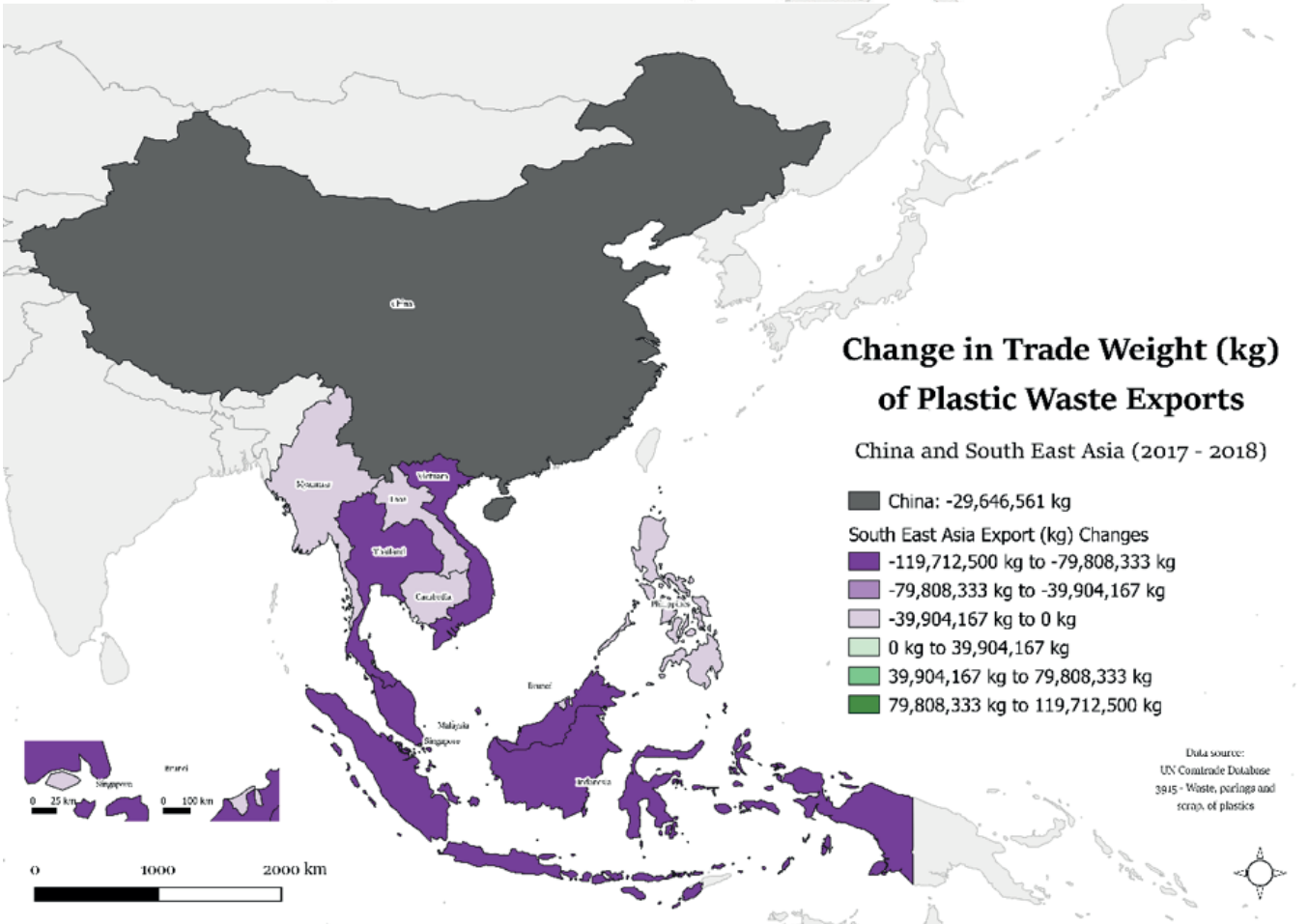
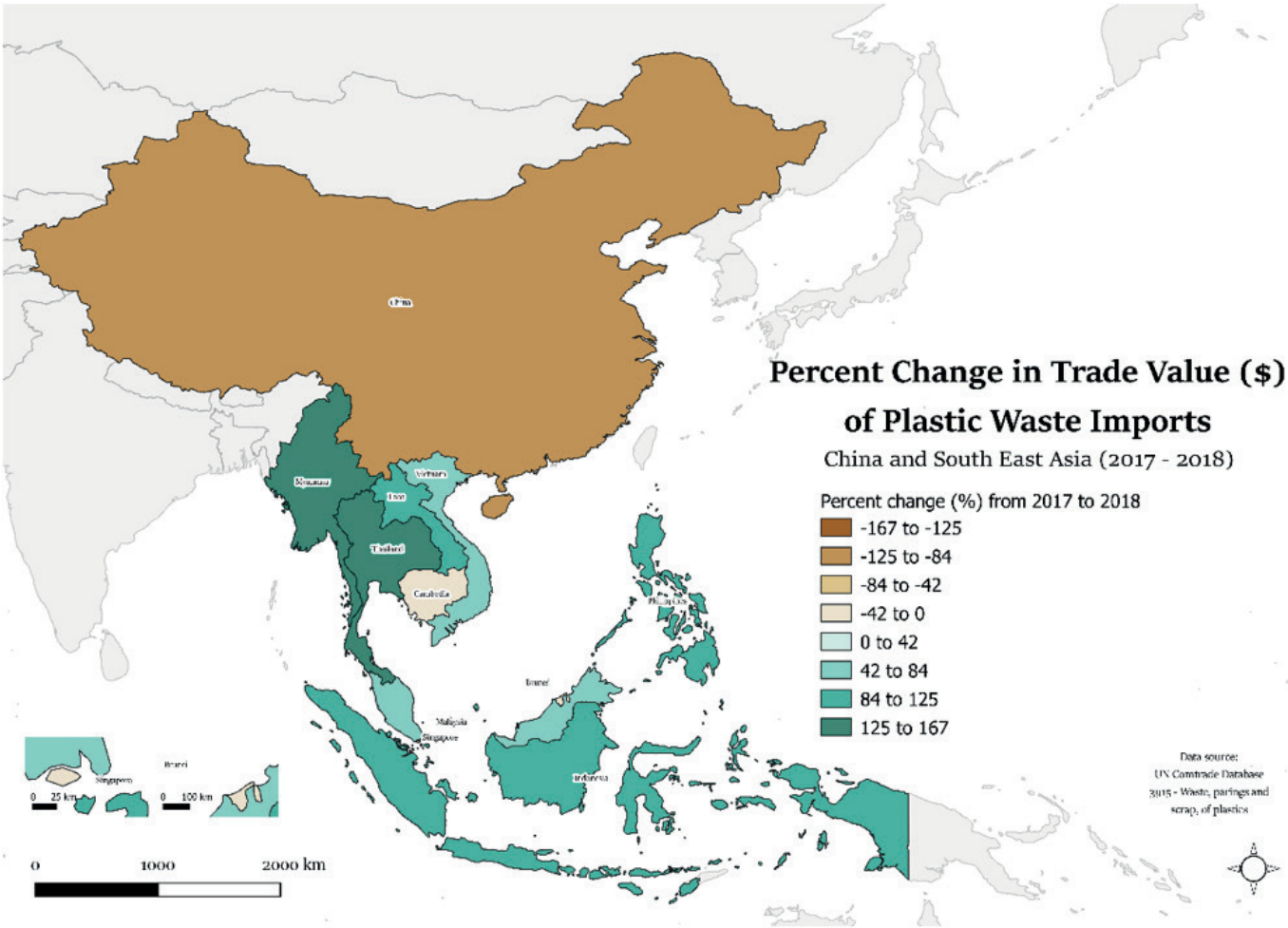


Figure 2. Plastic waste export changes from 2017-2018. A comparison of the trade values (USD) and trade weights (kg) of plastic waste exports by Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.



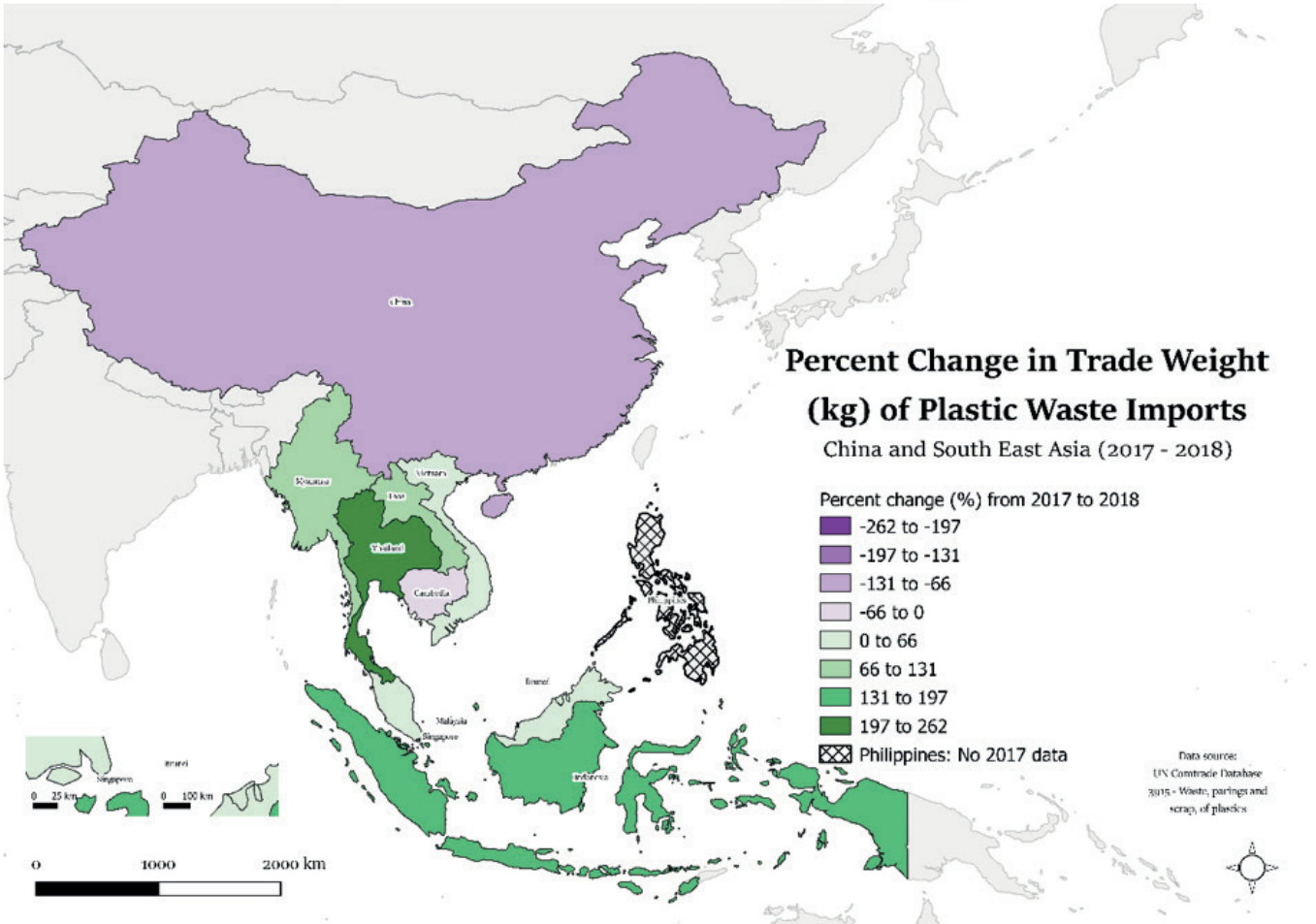


Figure 3. Plastic waste import changes from 2017-2018. Percent change is used to compare changes in trade values (USD) and trade weights (kg) of plastic waste imports by China and Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

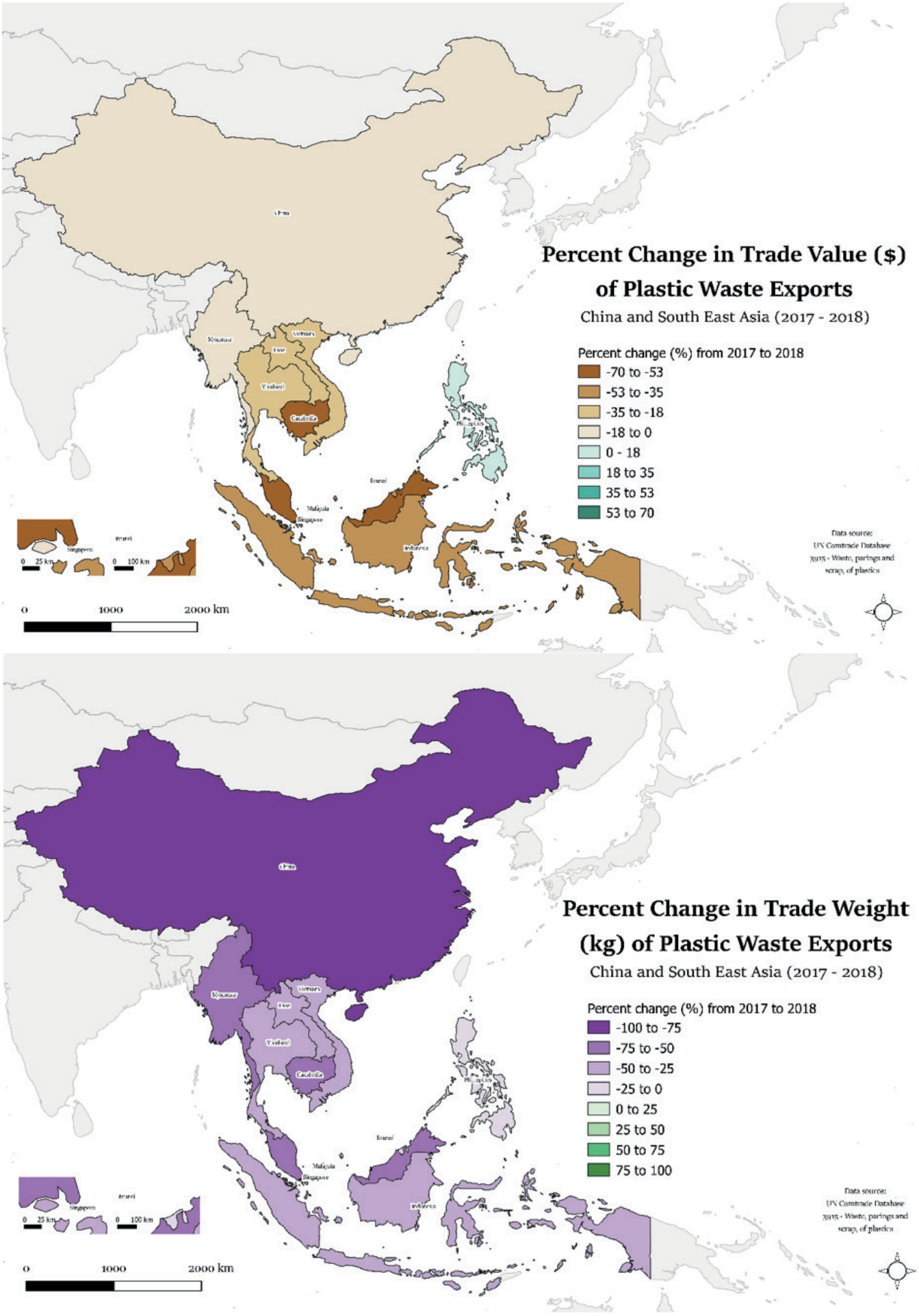


Figure 4. Plastic waste export changes from 2017-2018. Percent change is used to compare changes in trade values (USD) and trade weights (kg) of plastic waste exports by China and Southeast Asian countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

SDGs

Both waste in general and plastics specifically are mentioned as part of the targets or in indicators of three of the SDGs. These SDGs include Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable", Goal 12 "Ensure sustainable consumption and production patterns" and Goal 14 "Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Waste is included in target 11.6 of Goal 11, stating that the environmental impact of cities should be reduced, including by paying attention to waste management. Under this target the indicator 11.6.1. "Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities can be found. Waste is also mentioned under Goal 12 in two indicators and two targets. Briefly, target 12.4 states that environmentally sound management of all wastes should be achieved by 2020 with indicators 12.4.1 "Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement" and indicator 12.4.2 "(a) Hazardous waste generated per capita; and (b) proportion of hazardous waste treated, by type of treatment". Hazardous waste also includes plastic waste. Target 12.5, on the other hand, states that waste generation should be substantially reduced by 2030 through prevention, reduction, recycling and reuse. Plastics are only mentioned in Goal 14, under target 14.1 about preventing and reducing marine pollution of all kinds by 2025, in the indicator b) "floating plastic debris density" (United Nations, 2019).

Although waste is mentioned only in some of the goals, and plastic waste is not the main target of any of the goals, many of the other Sustainable Development Goals can also be analyzed from the perspective of plastic waste. This is due to fact that all of the goals are interconnected. For instance, plastic waste can be linked to Goal 3 "Health and well-being", Goal 6 "Clean water and sanitation" and to Goal 15 "Life on land". As an example of these, an article published in The Guardian, states that after the increase in plastic imports to Malaysia studies have shown high levels of contamination of water and soil close to the areas where the plastic is dumped and according to doctors, respiratory illnesses have become more common in villages with illegal factories (Giuffrida, 2020). All the SDGs are linked to each other, according to Pradhan et al. (2017). Thus, synergy occurs when progress in certain goals benefits other goals. Contrarily, a tradeoff occurs when progress in one goal delays the progress of other goals. SDG 12 is most associated with trade-offs (Pradhan et al., 2017). Furthermore, synergies and trade-offs occur between the sustainable development goals and the plastic waste trade. For instance, China's waste import ban can be associated with both synergies and trade-offs. Waste flows have been predominantly redirected to Southeast Asian countries due to the ban. In response, many Southeast Asian countries formed temporary import bans or revoked permits for imports. Although export bans would be a more effective way to decrease the waste flows, import bans will have similar effects in the long term. Import bans will end the cheap, easy ways for dumping waste, which will push developed countries to form new disposal facilities and deal with their waste domestically (C. Wang et al., 2020). According to the website of Synergies among the Basel, Rotterdam and Stockholm convention (2019), the first steps towards this have already been made in May 2019, a year after China's plastic waste import ban, when the Conference of the Parties to the Basel Convention, Rotterdam Convention and Stockholm Convention agreed on new regulations of international plastic waste trade with countries with little resources to manage imported waste.

Another example of the trade-offs and synergies related to China's waste import ban, can be analyzed from the perspective of waste pickers. According to Millington and Lawhon (2018), informal recycling is regarded as an important contribution to the livelihoods of many people living in Global South, due to job loss and the absence of formal jobs. Therefore, shifts in the global waste trade might impact the earnings of many waste pickers. For example, according to an article by The Diplomat, China's ban on waste import has had a significant negative socioeconomic impact on South Korean elderly waste pickers (Seo, 2019). The situation of waste pickers can also be associated with the SDG 8 "Decent work and economic growth". The goal states that progress is needed to reduce informal employment and promote safe and secure working environments to create decent work for all (United Nations, 2019). Since, the informal recycling of waste has been viewed as an extreme example of precarity and informality in job markets (Millington & Lawhon, 2018), progress towards Goal 8 could improve the situation for these workers.

Conclusions

This report has examined the availability of data on global plastic waste flows and the effect of China's plastic waste import ban on these flows. In addition to this, an analysis of synergies and tradeoffs between the Sustainable Development Goals and the global waste trade and China's ban was also provided. Geographical research methods are required to identify spatial patterns and to obtain a sufficient understanding regarding the global flows of plastic waste. Geographical analysis provides a diverse set of tools to deliberate plastic waste and its wider connections with society, politics and the environment. For instance, locating some of the global hot spots of plastic waste gives valuable guidance about whether the international law or national legislations in those countries provides enough protection for problems like global trade of plastic waste.

In the light of our research, instead of data availability, the main problem seems to be data accountability when it comes to the global plastic waste trade. Despite availability of the UN Comtrade data collected from 196 countries, the voluntary reporting of data and the lack or inaccessibility of reliable information about data collection methods decrease the accountability of the UN Comtrade statistics. Keeping these limitations in mind, the UN Comtrade data yielded patterns in international plastic waste trade. In the same time period that China drastically reduced its plastic waste imports, most countries in Southeast Asia increased their plastic waste imports. All countries in our case study, China included, decreased their export of plastic waste from 2017 to 2018. When comparing the increase or decrease of trade across different countries, it was fruitful to compare changes in the trade value (USD) with changes in trade weight (kg). For future research, expanding the time period of the datasets and geographic scale will improve understanding of global spillovers in the waste sector.

The global plastic waste trade and China's import ban can be linked to many of the SDGs, although waste or plastic more specifically are mentioned only as part of three of them. Additionally, the shift of global plastic waste flows to Southeast Asian countries after China's ban can be associated with both synergies and trade-offs. For instance, although the redirected plastic waste causes environmental, health and socioeconomic issues, many Southeast countries have begun forming their own import bans, which eventually might end the plastic exports from Global North.

In the context of global inequalities, it is always interesting how these policies and regulations are pushed through and justified politically. According to Mederake and Knoblauch (2019), marine debris, especially plastic, as an environmental problem has recently received significant media attention in the Global North. In addition to environmental problems, plastic waste and its poor handling also causes social and health problems. These environmental and social problems are also linked to each other, which once again demonstrates why sustainable development should be perceived and tackled from an environmental, social and economic ensemble. In the political realm, many things must be or happen to be perceived from a specific perspective. Interestingly, in the United States new policies on plastic waste have been decided under the public health theme, whereas in the EU the plastic problem has been politicized from the environmental perspective (Mederake & Knoblauch 2019). The perspectives from which a problem is perceived are a political choice that can be viewed critically.

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Department of Geosciences and Geography C18
ISSN 1798-7938
ISSN-L 1798-7938 (pdf)

Helsinki 2020

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